

The CHEMIST

Publication of

THE AMERICAN INSTITUTE OF CHEMISTS, INC.

V. F. KIMBALL, Editor, 233 Broadway, New York City

VOLUME XVIII

MAY, 1941

NUMBER 5

Editor

V. F. Kimball, 233 Broadway, New York, New York.

Contributing Editors

- E. R. Bridgwater, E. I. Du Pont de Nemours and Company, Wilmington, Delaware.
- A. M. Buswell, State Water Survey Division, Urbana, Illinois.
- Leo M. Christensen, College of Agriculture, University of Idaho, Moscow, Idaho.
- T. K. Cleveland, Philadelphia Quartz Company, Berkeley, California.
- George H. Coleman, The State University of Iowa, Iowa City, Iowa.
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- William B. O'Brien, The Dodge Chemical Company, 656 Beacon Street, Boston, Massachusetts.
- Harry S. Owens, Department of Chemistry and Chemical Engineering, University of Idaho, Moscow, Idaho.

THE AMERICAN INSTITUTE OF CHEMISTS
HOWARD S. NEIDMAN, Secretary
233 Broadway
New York, N. Y.

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The Constructive Work of Chemists

FOR some time the attention of the public has been directed to that part of chemists' activities which may be considered destructive—the chemist as a producer of warfare gases, or munitions, or fighting equipment. The immense constructive work of chemists has been too generally overlooked because of the present emergency.

It is refreshing, indeed, to know that THE AMERICAN INSTITUTE OF CHEMISTS, through its medal award this year, has recognized one of the most constructive of long-range programs being carried out by chemists for the economic and social betterment of America both now and in the future. This program is the application of chemistry, physics, and other sciences to the improvement of agriculture by the United States Bureau of Agricultural Chemistry and Engineering, under the able leadership of Dr. Henry G. Knight.

The possibilities of these applications are far-reaching. Soils, fertilizers, production, selection of crops, are being studied. In addition, experimental work is progressing on the use of agricultural products to improve the nutrition of large numbers of under-nourished citizens; problems of the distribution of perishable foods are being solved; and industrial outlets for surplus crops are being found. These projects offer tremendous promise for the future of agriculture as a producer of wealth instead of a "farm problem".

CHEMISTRY HALL LIBRARY

New Councilors Elected to Serve 1941 to 1944



E. R. BRIDGWATER

Rubber Chemicals Division Manager, E. I. du Pont de Nemours and Company, Wilmington, Dela.

STUART R. BRINKLEY
Associate Professor, Department
of Chemistry, Yale University,
New Haven, Conn.



FRANK O. LUNDSTROM
Chemist, Bureau of Agricultural
Chemistry and Engineering, U. S.
Department of Agriculture, Wash-
ington, D. C.

New York Chapter Urges Draft Boards to Conserve Chemists

The following resolution was adopted by the New York Chapter:

Resolution

WHEREAS, It is essential that a country, in order to defend itself today possess a large group of active and inventive chemists;

WHEREAS, The strong and sound position of chemistry in America is one of our greatest assets in our national defense;

WHEREAS, We have the industries to manufacture not only explosives and materials for chemical warfare, but also vast quantities of essential products and chemically treated products necessary for the equipment of an army;

WHEREAS, The chemists who make these industries possible through their work in research or production are men who have gone through an intensive and long period of highly specialized study and training.

WHEREAS, Even men who enter the chemical industry in the lowest rank, fresh from college, are required to have a four-year period of training and those who have had additional graduate study of practical experience have taken longer periods of time in order to reach their greater usefulness;

WHEREAS, It is of utmost fundamental importance to national defense that no unnecessary handicaps be imposed upon our national chemical industry; and

WHEREAS, Our chemical industry is already faced with a dangerous shortage of properly trained and qualified chemists which seriously threatens the defense needs of this country.

THEREFORE, Be it resolved that THE AMERICAN INSTITUTE OF CHEMISTS, New York Chapter, an organization interested in the welfare of this country and of the profession of chemists in the United States of America, heartily commends the Deputy Director of the Selective Service System for calling this situation to the attention of the local draft boards; and further commends the local boards for the coöperation they have shown in conserving the hard-earned skills of chemists for essential civilian duties of our defense.

New York Chapter Votes in Favor of Licensure

The New York Chapter of THE AMERICAN INSTITUTE OF CHEMISTS at its annual meeting, following general discussion, adopted the following resolution in favor of the licensure of chemists.

Resolution

WHEREAS, As the professional advice of chemists must be relied upon in making many decisions affecting the life, safety, health and property of each and every person within the State of New York;

WHEREAS, There is at present no legal definition of chemists, nor legal qualifications whereby a person acting as a chemist can be properly distinguished as such, nor whereby a corporation can be recognized as employing qualified chemists;

WHEREAS, The lack of licensing of chemists has permitted those rejected by other professions to practice as chemists;

WHEREAS, The public weal of the State of New York will be materially enhanced through the legal definition of the Profession of Chemistry by:

1. Limiting the use of the title "Chemist" to those qualified by education and experience to practice the profession.
2. Restricting the use of the title "Licensed Chemist" so-created to those who have complied with legal requirements.
3. Prohibiting the use of the word "Chemist" by corporations or business concerns unincorporated, which do not, in fact, employ licensed chemists or chemical engineers for controlling or supervising processes and/or investigations requiring the special education and skill of a chemist.

IN ORDER TO:

- (A) Improve the professional, ethical and social well-being of the Chemist.
- (B) Further public recognition of the service which the Profession renders to Society.
- (C) Promote better relationship between the Chemist and his employer.
- (D) Improve the relationship in a spirit of coöperation with other professions for guarding and upholding high standards of honor and professional conduct.

WHEREAS, There is no other Professional Society, which has as its aim the advancement and maintenance of the professional, ethical

and social well-being of the Profession of Chemistry;

THEREFORE, Be it resolved that THE AMERICAN INSTITUTE OF CHEMISTS, New York Chapter, hereby approves and sponsors the enactment of laws for licensing of Chemists to practice in the State of New York, and urges that the Legislature of the State of New York give greater attention to bills introduced for this purpose, as a means of further protecting the citizens of our State.

Student Medal Awards—1941

Chapters of THE AMERICAN INSTITUTE OF CHEMISTS each year award student medals to graduating chemistry students from selected colleges "in recognition of leadership, excellence in scholarship, and character".

New York Chapter Awards



Secretary Neiman awarding student medals to New York Chapter medalists at the annual meeting of the Chapter on May twenty-third. Two medalists do not appear in this picture.

Joseph Abere, Queens College

John Joseph Craig, New York University at University Heights

Henry Freiser, College of the City of New York

Edward W. Krummel, Fordham University
Rita G. LaTour, College of Saint Elizabeth
Howard Levene, New York University at Washington Square
Joseph Sausville, Polytechnic Institute of Brooklyn
Louis Smith, Newark College of Engineering
Ulrich Paul Strauss, Columbia University
Stephen E. Ulrich, Rutgers University
George Weiss, Brooklyn College

Washington Chapter Awards

Richard Clark, University of Maryland
Donald Collier, The Catholic University of America
William Henry Eberhardt, The Johns Hopkins University
Latimer Evans, The American University
Isaac Feldman, The George Washington University
Maurice Winfield Frazier, Howard University
Russell J. Rowlett, Jr., University of Virginia

New Roster

A new membership list of THE AMERICAN INSTITUTE OF CHEMISTS will be published in the October issue of THE CHEMIST. Every member of THE INSTITUTE is requested to fill out the form below and return it as soon as possible, to ensure that he will be listed correctly.

THE AMERICAN INSTITUTE OF CHEMISTS
233 Broadway
New York, N. Y.

Please make the following listing in The Roster:

Name

Business Position

Name of Firm

Address of Firm

Annual Meeting of The American Institute of Chemists

Washington, D. C.
May 17, 1941



Photo Courtesy of the Department of Agriculture

**From left to right: William Blum, Past Medalist
Henry A. Wallace, Vice President of the United States
Harry L. Fisher, President of The American Institute of Chemists
Henry G. Knight, Medalist**

The Nineteenth Annual Meeting of THE AMERICAN INSTITUTE OF CHEMISTS was held at the Wardman Park Hotel, Washington, D. C. on May seventeenth.

The Medal of THE INSTITUTE was presented to Dr. Henry G. Knight by Vice President Wallace, at a banquet attended by a large number of chemists, their wives, and guests. Mr. Wallace's remarks and Dr. Knight's acceptance address are printed elsewhere in this issue of THE CHEMIST.

Reports of the various committees were presented at the annual



see Errata
Vol 18 p 274

From left to right:
Past Medalist: Horace G. Byers
Past President: Maximilian Toch
Treasurer: Walter J. Murphy
Secretary: Howard S. Neiman



Chairman of New York Chapter:
William Howlett Gardner
Past President: Robert J. Moore
Past President: Frederick E. Breithut
President Washington Chapter: Albin H. Warth



Councilor: Marston L. Hamlin
Mr. Thomas H. Tremearne
Mr. M. R. Bhagwat

business meeting in the afternoon, followed by a talk given by Dr. Donald H. Andrews on "National Defense and the Training of Chemists".

The following new councilors were elected to serve for the term 1941-1944: E. R. Bridgwater, Stuart R. Brinkley, and Frank O. Lundstrom.

The members at the annual business meeting voted to abolish the class of membership of THE INSTITUTE, called "Student Membership." This revision of the Constitution is subject to a referendum mail vote of the Fellows of THE INSTITUTE before it can take effect.

Tours through the laboratories of the Federal Bureau of Investigation were also on the program for the day.

The Washington Chapter acted as host and it deserves the highest commendation for its excellent arrangements and warm hospitality.

Introductory Remarks

By Dr. Harry L. Fisher

Mr. Vice President, Mr. Secretary, Dr. Knight, Members of THE AMERICAN INSTITUTE OF CHEMISTS, and Guests. In the name of THE AMERICAN INSTITUTE OF CHEMISTS I greet you and welcome you to this occasion when it is our pleasure to honor a chemist for his outstanding attainments. We are especially appreciative of the presence of Mr. Wallace and Mr. Hill who have been willing to step out of their busy hours and join us at this time. We thank them for their courtesy.

A number of years ago at an impromptu gathering of musicians on board an ocean liner—in the days when traveling to Europe was a normal part of living—each man was called upon to say something. One, who had been sitting next to a Mr. Gray, got up and said, "I feel quite poetic since all evening I have been rubbing against Gray's L E G."

"The curfew tolls the knell of parting day,

A line of cars winds slowly o'er the lea.

A hiker plods his absent-minded way,

And leaves the world quite unexpectedly."

(With apologies to poet Gray.)

Well, by the same token, I presume I should feel agricultural or chemical or political or perhaps musical. Let's call it musical since I wish to tell a musical story!

Sometimes it is well to make comparisons by opposites. (I must be careful what I say, however, or it may come back as a boomerang).

Deems Taylor in his book, "The Well Tempered Listener," repeats the story told by Edward Goosens of a wealthy English musical amateur who had aspirations towards being a conductor. So he hired the Queen's Hall Orchestra and started rehearsing a program. The rehearsal didn't go very well, and after an hour or so both conductor and orchestra were pretty irritable. Finally the timpani player, completely befuddled by the conductor's rather vague beat, anticipated a cue by sixteen bars, and in the midst of a quiet passage suddenly came in—bang, crash, boom!—with a fortissimo on the kettledrum. Whereupon the conductor, in a rage, threw down his baton, glared at the orchestra, and demanded, "Now, who did that?"

When a chemist does a good job he makes no noise about it, and we do not beat the drum, or serenade him with a brass band or a symphony orchestra. But we do have a way of honoring him and calling the attention of the community to his good work.

Presentation Address

By Vice President Henry A. Wallace

A report of the Vice President's remarks as he presented the Medal of the Institute to Dr. Henry G. Knight.

I WANT to confess that one of the rare privileges of becoming Secretary of Agriculture was associating with the wise old Bureau chiefs, of whom I see several here tonight. Everyone of them is a real character in some way or other. He has learned to take it from the appropriation committees, from the farmers, from the columnists, from the press, and even from the Secretary's office.

So many pressures pushing in so many different directions would destroy small men, and I have seen big men lose their tempers, but the man we are here to honor tonight, Dr. Knight, is not a small man, I have never seen him lose his temper. I know no one who has a more cheerful coöperative spirit. I have never seen it fail him, even when I knew he was taking it on the chin. He has never let a temporary reverse get him down. The explanation of Dr. Knight's attitude toward people and especially toward farmers is found in his boyhood. Drought forced his family from a Kansas farm and they migrated to the Pacific Northwest. He anticipated then what has actually happened since. He was a teacher then and a teacher now. Fifty years have proven he was right, the last ten years in a most dramatic way.

His mother died when he was ten years old, and on her deathbed she made him promise that he would get an education and amount to something in the world. So he skimped himself through college while earning ten dollars a month as custodian of the stockroom.

He later became director of the experiment station and dean of agriculture of the University of Wyoming, Oklahoma Agricultural College, and West Virginia University. By then his accomplishments were sufficiently great so that in 1927, he was taken to Washington as chief of the Bureau of Chemistry and Soils, as it was then called. During the past fourteen years he has made the Department of Agriculture

serve the farm in a most practical way, and the fruits of his work are still to come. I could talk to you about soy bean oil, cottonseed meal, etc. of which we hear from time to time. But the most significant of his accomplishments in the Bureau of Agricultural Chemistry and Engineering will come out of the four great regional laboratories, located in Philadelphia; Peoria; New Orleans, and Albany, California. The systematic work of the eight hundred scientists of these laboratories, just getting started, will have the most profound effect on agriculture and on the entire nation. It will help materially, too, in the national drive for substitutes for goods which cannot be imported. I hope and sincerely trust that the training and experiments in these laboratories will also be of help to our neighbors in South America. Perhaps the greatest work will be for the welfare of the American consumer.

Future Importance of the Regional Laboratories

We plan to make out of these laboratories Meccas to which will come scientists from all over the world. In another ten years, I feel that this work will attract scientists from everywhere. In 1794, France was in turmoil. Then France set up the Institute of Theoretical and Applied Science, in which men who were more than post graduates could gather together and further each other's research studies. These laboratories had a profound effect on the scientists of France and of the world for at least three generations. If events in this country should take a certain turn, we can visualize these four regional laboratories ready to take a similar place, with extra curricular activities something like the post graduate work which exists in some of our Government Departments—men coming in from industry, and chemists coming in from their universities for the purpose of learning not only science, but to anticipate in terms of science the economic and social changes which are taking place in the world today.

I was talking to Dr. Blum about the scarcity of nickel. Eighty-five per cent comes from the mines in Canada and but fifteen per cent from other places, but it is impossible to step up the production of nickel twenty per cent, taking into account priorities for the use of machinery needed elsewhere; and we began speculating about whether it might not be necessary—until the Nazi-spread expression of imperialism is utterly crushed, to gear up our industrial machine and our science to that point of continuous production in this country which would do

the job. The difficulty of getting supplies in many lines, all of which are necessary for defense will make this necessary, until the Nazi menace is utterly crushed.

There is always a Frankenstein character about science and chemistry which has disturbed me at times, because its possibilities are so amazingly great and society's responses are so limited. I remember when I was editor of a farm paper, I suggested the word "scionomics" as a word to cover the science used to build bridges between science and society, so that the discoveries of science can be meat for man in the larger sense.

In case events take a world turn, there might be a certain more significant importance to your laboratories, Dr. Knight. These great regional laboratories can take into account the social and economic complications of the rapidly changing world in science. The scientific brain fascinates me completely. With slight shift of attention, it would be so easily possible for the scientific brain to take into account the changes to be made in the social and scientific world. There is no possibility of avoiding these changes. They are forced upon us. We hope these laboratories will not apply only to the scientific world, but that they will gradually increase their part in the economic, social, and perhaps political world as well.

THE AMERICAN INSTITUTE OF CHEMISTS is a most honorable organization. I feel that this organization, great as it is, is being honored tonight as much as you are, Dr. Knight. You both are profoundly interested in seeing the remarkable principles which are implicit in chemistry put to work to help, to the greatest extent possible, in the defense of our beloved country during the months and years immediately ahead. We will outstrip Nazi Germany in scientific progress because gangsters cannot command the best in science. Only in a democratic world can science make progress. I have the faith to believe that American chemistry, unfettered by any ideology or compulsion, will outstrip, both on the theoretical and practical side, the best that Nazi-terrorized Germany can bring to pass; and that our scientists have just begun their greatest service to and in this country.



Accomplishments of the U. S. Bureau of Agricultural Chemistry and Engineering

Remarks of Dr. Henry G. Knight upon receipt
of the Medal of The American Institute of
Chemists from Vice President Wallace.

I ACCEPT with humility the honor that is being bestowed upon me tonight. It is all right, I suppose, for a chemist to express his satisfaction over the results of research, just as it is all right for an artist to admire his painting. But when you *single* out a chemist and publicly acclaim his accomplishments and arrange an affair of such signal honor as THE AMERICAN INSTITUTE OF CHEMISTS does when it presents its annual medal, the ceremony is so *impressive* that it is sometimes difficult for the recipient to properly express his appreciation. That's about the way I feel now.

However, when I look over there on the wall at the pictures of the persons who have passed through a similar experience to the one I am going through tonight, it gives me the courage to say *thank you*, from the bottom of my heart. The thirteen men and one woman who have been the recipients of this medal have added materially to the world's fund of knowledge in the chemical field, and the results of their efforts have helped to make America a better place in which to live. It is a pleasure for me to have my name associated with the names of the distinguished persons who have received the INSTITUTE's medal. I accept the honor, Mr. Toast Master, and give you permission at this time to add my name to the names of those who have received this honor in the past.

As the recipient of this medal I assure you that I appreciate the honor that goes with it. And I know that I would not be receiving this honor had it not been for the loyalty and coöperation of the hundreds of men and women who have worked with me during the past years. I therefore desire to share this honor with my former and present colleagues and, particularly, with the men and women of the

organization which I now represent, the Bureau of Agricultural Chemistry and Engineering of the United States Department of Agriculture.

In honoring me you have honored my fellow workers and spot-lighted the research work of the Department of Agriculture. We all appreciate this recognition. I believe the Bureau of Standards is the only other Government agency that has shared in the INSTITUTE's awards. The other awards, since started in 1926, have gone to persons in industry and in research and educational institutions.

And now, according to the precedent that has been established, it becomes my duty as the recipient of this year's medal to recite some of the accomplishments of the organization which I represent. That's done, I suppose, so that the INSTITUTE members and guests may determine whether or not the committee was wise in its selection of the medalist. Please understand that I recite these accomplishments not in a boastful way, but merely to high-light the results of some of our most successful research.

Soil Investigations

There is every indication that the bluegrass region of Kentucky—famous for its beautiful women, fast horses, and good whiskey—possesses a soil that has an ideal combination of such desirable chemical elements as manganese, calcium, phosphorus, nitrogen, iodine, and potash. There are other soils in some parts of the country that contain *undesirable* elements. The one element that has caused the most trouble is selenium. Selenium is a twin sister to sulfur and toxic to plants and animals. Each year thousands of cattle and sheep in parts of some of the Western States die from eating plants that have absorbed selenium from the soils on which they grew. In years past I have followed the course of a herd of sheep for more than twenty miles across the plains of Wyoming by the dead animals poisoned by eating woody aster which I now know contains enormous quantities of selenium.

Investigations by scientists of the Department of Agriculture and of Wyoming and other Western States showed that selenium is present in large enough quantities to make it an agricultural problem in the soils and vegetation in some parts of the country, particularly in some areas with a rainfall of less than 20 inches a year. These investigations also revealed that seleniferous areas are closely correlated with certain geological formations. As a result of this research we know a great deal about selenium today. We know where to look for the trouble, and

how to avoid it in many cases. These investigations have revealed the *cause* of heavy monetary losses to livestock producers in certain areas of the West, as well as calling attention to the danger to people from the consumption of foods produced on seleniferous soils. The man who conducted some of the most outstanding selenium investigations is a member of THE AMERICAN INSTITUTE OF CHEMISTS. He is here tonight.

Sweetpotato Starch

In 1933, Senator Pat Harrison asked the Department of Agriculture if the results of any of its investigations gave promise of benefiting the Southern farmer. He was told that we had learned how to extract starch from sweetpotatoes. He got a WPA grant of \$150,000 and was instrumental in getting a sweetpotato starch plant established in an old abandoned sawmill building at Laurel in the southern part of his home State of Mississippi.

That plant, the only one of its kind in this country, manufactured 140,000 pounds of high grade white starch in 1934, and increased production each year until it ground around 275,000 bushels of potatoes and turned out nearly 3 million pounds of starch in 1939. The cost of manufacturing this starch was reduced from 13 cents a pound the first year to about 3 cents a pound last year. Sweetpotato starch can now be used to replace an imported product. In addition to that, it offers Southern farmers another cash outlet for one of their major crops. About 1,000 coöperative sweetpotato farmers who control the starch plant are profiting from the results of this research. The Laurel plant which had to be operated largely on a pilot plant basis for the first few years, made a profit for the first time in 1939. The starch may be used for sizing in textile mills, in laundries and other industries, as well as for food purposes. A trial test in the Bureau of Engraving and Printing showed that dextrin made from sweetpotato starch could be used for the adhesive on postage stamps. Further investigations with the sweetpotato revealed that a high grade carbohydrate livestock feed can be made from it. As a result of these ventures a livestock feed has been manufactured from sweetpotatoes at St. Francisville, Louisiana, and a full-fledged sweetpotato livestock feed plant is being established in Alabama. I am proud to say that a member of the organization I represent is largely responsible for the development of this new and promising Southern industry. He is here tonight.

The gay fast colors that some of the men and women are wearing

here this evening, and that are being worn rather generally today throughout the country are largely the result of research by chemists of the United States Department of Agriculture. This research developed new technical methods for the production of intermediates, fast and brilliant dyes for cotton. It was started because the World War in 1917 cut off our supplies of German dyes which were the best in the world at that time. The American dyes of today are equal to those that are produced anywhere else. It is no longer necessary for us to go outside of this country for our dyes. This one piece of research has expanded the cotton market millions of dollars a year. One of the men who played an important part in this dye work is sitting at this banquet table tonight.

It was said a few years ago that you couldn't produce good cucumber pickles in the South on account of the hot weather. So cucumber growing in that region was confined largely to production for the fresh vegetable market, until recent research by scientists of the Department and the North Carolina Experiment Station showed that with a slight modification of the pickling methods used in the North, quality products could also be produced under Southern conditions.

It is now possible and practical to pack high-quality fermented cucumber pickles, including dill pickles which are the hardest to produce, in the South. Thousands of farmers are now benefiting from this new development in North Carolina where the work was started a few years ago. As a result of this research North Carolina has become the fourth largest pickle producing State in the country. One of the men responsible for this development is with us this evening.

Soybean Products

At the Bureau's Soybean Laboratory at Urbana, Illinois, considerable progress has been made in the development of paints, varnishes and enamels from the oil of the soybean, and in making plastics from the meal which is the residue that is left after the oil has been extracted. Partly as a result of the research at this laboratory great quantities of paint containing soybean oil are now sold.

One paint company alone reports that it has made and sold more than a million gallons of soybean oil paint. The more desirable paint oils, like tung oil and linseed oil, are known in the technical trade as

"drying oils" because they permit the paint to dry rather rapidly. Since the natural soybean oil does not dry very fast the chemists had to try to develop methods to make it dry faster so that it could be satisfactorily used in the manufacture of paints and varnishes. They did develop them. And now soybean paint may be used for painting houses, barns and other objects. I might say that soybean paint is being tried experimentally for marking streets and highways. This requires a *very* quick drying paint so as not to hold up traffic, and if the soybean paint can measure up to this test it will help in the industrial utilization of the soybean crop.

Many oranges, though ripe, lack the full yellow color which the public associates with a ripe orange. This condition which is particularly prevalent with some varieties during the early part of the harvesting season curtailed the marketing a great deal until Department chemists solved the problem by treating these green-colored oranges with ethylene gas. The treatment simply bleaches out the predominant green color and leaves the orange a beautiful natural yellow. The chemical investigations leading to the development of this treatment which is now in rather general use cost the taxpayers of the country about \$4,000 and is estimated to be worth about \$4,000,000 a year to the producers of citrus fruits in Florida alone and about the same amount to producers in California. And yet some people say that research doesn't pay. I know it does. I think the criticism that sometimes comes to research comes mainly because the scientists are forced to try the results of their laboratory investigations on a commercial scale before they have had time to pick out all of the "operating bugs." That happened in the case of the sweetpotato starch plant, and it's likely to happen to any undertaking that is pushed too fast. Developments and discoveries and inventions take painstaking time for checking and rechecking, and they shouldn't be pushed too rapidly.

Substitute for Arsenate of Lead

In the summer of 1928 I asked the then Assistant Chief of our Bureau to go to the Wenatchee Valley in Washington to see if he could help find a substitute for the arsenate of lead that apple growers were forced to apply in excessive amounts in an effort to protect their fruit from the insects. He came back and told me that the trees were sprayed so heavily that they looked like they had been whitewashed.

In an effort to help solve this problem we put scientists to searching for substitutes for arsenate of lead. It was necessary for this substitute

to do four things. It must kill the insects, not injure the foliage, be economical to use, and harmless to those who consumed the fruit. That was quite an assignment but the investigators tackled it.

Organic compounds containing sulfur were selected as promising substitutes since sulfur had already proved its value as an insecticide. After considerable research extending over quite a period of time the investigators tried a product made by reacting sulfur and diphenylamine. This product, known as phenothiazine, proved extremely toxic to mosquito larvae which was the only insect available to the entomologists for laboratory tests at that time. Well, to make a long story short, it was found that it killed insects, that it was harmless to the foliage, and that it could be manufactured at a reasonable cost. That left only one test, namely, to show whether it was poisonous, especially to human beings.

This test was first made with white rats at the Bureau's pharmacological laboratory at the Stanford University School of Medicine in San Francisco. It was later made with rabbits. These investigations revealed that no matter how much phenothiazine the animals got they continued to live. This checked off the fourth and last requirement and the investigators felt that they had at last found an insecticide that gave great promise of being a substitute for arsenate of lead.

But that was not all. We sometimes start out to look for the answer to one problem and wind up with something entirely different. That happened in this case. During the pharmacological investigations it was revealed that phenothiazine had some value as a urinary antiseptic. This is something that has been long needed. One of our own investigators volunteered for the first test of its effects on human beings. The result was satisfactory. Then the Stanford Medical School joined with us to test phenothiazine on a clinical basis. A group of sixty-one patients with urinary tract infections was selected for this test. All but eight were either cured or definitely relieved.

Encouraged by promising findings it was reasoned that if phenothiazine killed lower forms of life like insects and was non-poisonous to the higher forms that it might be used as an anthelmintic for intestinal infestations of sheep, hogs, and other domestic animals. A quantity of the chemical was synthesized and sent to the Bureau of Animal Industry where it was used and found to be very effective against some of the most resistant intestinal parasites as well as being generally effective against many other types of infestation. Phenothiazine is now used

extensively as an anthelmintic and that one "find" in the very beginning of its use is already worth thousands of dollars to the livestock industry in this country. Two of my colleagues who did the original phenothiazine work are here tonight.

I assume that most of you are familiar with the Department of Agriculture's new Regional Research Laboratories which I have been asked to discuss. But to refresh your memory and for the benefit of those who have not heard of this new program let me give you a brief review of this rather extensive Government undertaking.

The Department of Agriculture has been searching for industrial uses for farm products in a limited way for twenty-five or thirty years, and has some rather outstanding accomplishments to its credit. But searching for industrial outlets for farm products was a sort of a side line compared to the main agricultural program. It was confined largely to work on byproducts or what we used to call farm wastes until the surpluses forced us to start searching for more profitable outlets for the surplus crops. Congress became so interested in this industrial utilization idea that it authorized an annual appropriation of four million dollars in 1938 and instructed the Secretary of Agriculture to establish and maintain four Regional Research Laboratories, one in each of the major farming areas of the country to search for new and wider industrial outlets and markets for farm products.

The Regional Laboratories

After a careful survey, these laboratories were located at Peoria, Illinois, for the Northern part of the country; New Orleans, Louisiana, for the South; Philadelphia, Pennsylvania, for the East; and Albany, California, for the West. The Northern Laboratory is searching for new and wider industrial outlets and markets for corn, wheat, and agricultural residues or waste. The Southern Laboratory is working on cotton, sweetpotatoes, and peanuts; the Eastern Laboratory on apples, tobacco, milk products, potatoes, vegetables, animal fats and oils, hides, skins and tanning materials; and the Western Laboratory on wheat, potatoes, apples, vegetables, fruits, alfalfa, and poultry products and byproducts.

All four of the laboratories have been occupied and research is now under way at these places. There is an average of more than 40 scientists employed at each of the laboratories, or a total of more than 175 at

the four. There are about 25 sub-professional employees plus the clerical and administrative help. There are altogether more than 400 persons already at work in these laboratories and the staffs are being enlarged. The expansion will continue until there will be a total of between 800 and a thousand scientists searching for industrial outlets for farm crops in the four laboratories. This, as you can see, is an enormous program filled with great possibilities, but with few milestones to guide the searchers. The investigators in these laboratories are moving as fast as it is humanly possible with their research work and every possible effort is being made to inaugurate projects that promise immediate help to the farmer.



Architect's drawing by courtesy of the U. S. Department of Agriculture

On account of the size of this new research program we are able to approach the problem on a larger scale than we've ever been able to do before. This will be very helpful. One of the reasons research in the utilization of farm products has moved slowly in the past is because the educational institutions which do agricultural research have not had the money to carry their findings beyond the test tube stage, which is only the first in several steps in the development of a new product. In order to shorten the gap between test tube discoveries and commercial production, these new research laboratories are establishing what are called "pilot plants". These are really small commercial plants, but large enough to enable the checking of laboratory findings before they are turned over to industry.

Industry has found the pilot plant method of checking on the commercial development of an article a very profitable part of its research program. It has followed this method for a good many years. But pilot plant research is far more expensive than test tube investigations, and this is the first time agricultural workers have had sufficient funds to take their findings much beyond the test tube stage.

It may interest you to learn that one entire wing, or roughly one-third, of each of these four research laboratories is being utilized for pilot plant work. A large pilot plant is now under construction at the Northern Laboratory at Peoria, Illinois, for the study of motor fuel from farm crops. A pilot plant is being constructed at the Western Laboratory at Albany, California, to study the frozen fruit and vegetable work. The pilot plant wing at the Philadelphia Laboratory was just recently finished, and the wing for this work at the New Orleans Laboratory will be completed during the summer.

Future Program of the Regional Laboratories

Naturally I can't report very much in the way of progress from these new laboratories because our research is just getting under way. But I feel that we have done a pretty good job in getting started as soon as we have, considering the tremendous difficulties we had to encounter in pioneering a program of this kind. I feel that my colleagues—the men who have borne the brunt of developing this program—are entitled to a vote of thanks for the good work they have done. Some of them were originally in the Department of Agriculture, some came from industry and some from educational institutions. They have come from all parts of the country and are specialists in a great many fields. When I think of these laboratories I like to think of these intensely interested scientists busy at their tasks rather than the imposing structures of brick and stone in which they work. Ideas are what count, and it's ideas that we need in this new program. A scientist with a continuing flow of ideas is a valuable person in our work even though only a small percentage of his ideas are workable.

World conditions have changed a great deal since these laboratories were authorized in 1938, and it is a comforting thought to know that these laboratories could be turned into research institutions for national defense should the occasion demand.

We import most of our root starches, much of our tin, and practically

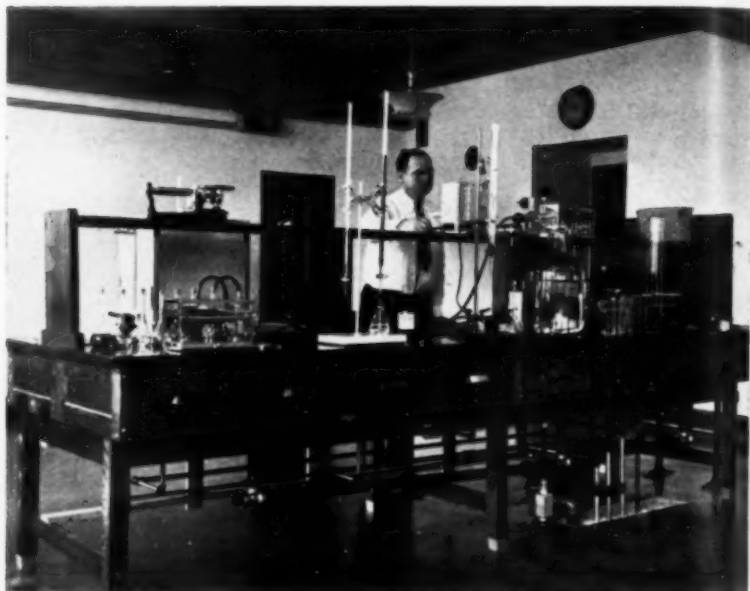


Photo by courtesy of the U. S. Department of Agriculture

Analytical Laboratory of the Eastern Regional Research Laboratory

all of our rubber from the East Indies. Half of our tanning materials and something like half of our linseed oil comes from South America, and practically all of our tung oil comes from China. If we should lose the freedom of the seas and be cut off from the rest of the world our export trade would drop below the low mark where it now stands. It is reasonable to assume that such a situation would further increase the surplus problem and make it necessary for us to create in this country, if possible, greatly expanded markets for many of our major farm crops. That is the object of the laboratory program.

So it seems to me that the establishment of these pioneering laboratories marks an epoch in the application of science to the solution of one of our great agricultural problems. They can be useful in a great many ways, and I look forward to the time when I may give you a more detailed report on the accomplishments from these halls of Chemistry and Engineering.

National Defense and the Training of Chemists



By Donald H. Andrews, F.A.I.C., Chairman, Chemistry Department, The Johns Hopkins University.

Address delivered at the Annual Meeting of THE AMERICAN INSTITUTE OF CHEMISTS in Washington, D. C., May 17, 1941.

A RECENT editorial in the *New York Times* states that the struggle between the totalitarian states and the democracies is a "production tug-of-war". That small phrase sums up neatly the essential problems which are facing chemistry in the effort to aid national defense. For this tug-of-war is in a dangerously close balance. In some way we have to throw five thousand more chemists on our end of the rope.

In the last war we learned a great deal about production. As I have heard one of our distinguished colleagues, Frank G. Breyer, state on a number of occasions, what we learned about production in the last war was worth the whole cost of the war. But today we are facing new production problems because this is a new kind of war. It is a very specialized kind of war. It is a war of precision. One might almost say of delicacy. Battles are not being won with bullets or cannon balls, but with finely wrought instruments and skillfully synthesized molecules. It is a war of hairsprings and traces of rare elements, a duel with the sixth decimal place as the weapon, parrying with double bonds and side chains. Accordingly the demand is not for strong muscles but for disciplined minds.

Moreover this is no one-round fight with a decision on a quick knock-out but a real tug-of-war which may last more years than we like to think about. This time element throws into even higher relief the problem of training. It is true our immediate hope of holding

off the dictators depends on the men who can put their shoulders to the wheel right now. They have to do the job at hand and do it well. But for the final success we have to get the five thousand extra men on our end of the rope. That is precisely the task facing chemistry today.

It is, of course, not a problem peculiar to the field of chemistry. It is being faced in every one of the professional fields vital to defense. Moreover, the educational institutions of the country, equally aware of this problem, are also taking active steps to meet it. The American Council on Education in Washington has organized the National Committee on Education and Defense with five sub-committees to deal with special issues, and the work of these committees has been most effective.

From the point of view of education there are three major problems to be met in organizing chemistry for defense. The first problem is to prevent the young men who can be trained as chemists and engineers from voluntarily enlisting in the army and navy under the influence of misguided patriotism. The second bulletin of the Committee on Education and National Defense quotes President Roosevelt from the *Washington Post* of August 15 as follows: "Reports have reached me that some young people who had planned to enter college this fall as well as a number of those who attended college last year, are intending to interrupt their education at this time because they feel it is more patriotic to work in a ship yard or to enlist in the Army or Navy than it is to attend college. Such a decision would be unfortunate. We must have well educated and intelligent citizens who have sound judgment in dealing with the difficult problems of today. We also must have scientists, engineers, economists, and other people with specialized knowledge to plan and to build for National Defense as for social and economic progress.

"Young people should be advised that it is their patriotic duty to continue the normal course of their education unless and until they are called, so that they will be well prepared for greater usefulness to their country. They will be promptly notified if they are needed for another patriotic service."

It is particularly important to emphasize this because of the difference in the situation now as contrasted with that of 1914-1918. Secretary Parsons of the American Chemical Society in his address before the meeting at St. Louis pointed this out. "In 1916 the chemical industry had but blossomed in this country, and the government was forced to become the producer of materials. At the end of the World War,

there were more than four thousand chemists in uniform functioning as chemists, a large portion of them being commissioned officers . . . I mention all this to depict the vast change that has taken place. Today with one or two minor exceptions all material is being or will be produced in plants financed or subsidized by the government to the extent of many millions of dollars but operated by private corporations . . . The armed forces today need no chemists in uniform to function as such for the various arsenals prepared themselves in advance with experienced employees in civilian capacity through the Civil Service Commission. The government itself has no need for enlisted chemists. Even Chemical Warfare Reserve Officers trained for anticipated needs, but as yet supernumeraries, are largely being held in a Reserve Pool in order that they may continue their present usefulness in industry."

As Dr. Parsons says, the need for chemists is not in the regular army but in "the production army" of which most of us are already members.

"You're in the production army now,
Along with the man behind the plow.
And you'll never get rich"

The second problem is to ensure that the Selective Service Boards grant deferments to chemists and to potential chemists. The hundreds of local boards scattered over the whole country are bound to interpret policies and regulations differently, no matter how patriotic their motives. This was recognized from the start by the Committee on Education and National Defense and by the Selective Service Headquarters itself. The sub-committee on military affairs, with President Isaiah Bowman of The Johns Hopkins University as chairman, has been in close coöperation with the Selective Service officials and to date the results are eminently satisfactory on both sides.

When the Selective Service Act was first discussed in Congress there was a clamor from many people who feared that its operation would affect adversely a number of specialized groups. Many people thought the doctors ought to be exempt. Others that students as a class should be deferred, and so on down the line. Because of the experience in the last war the Selective Service officials and the Committee felt that such class deferment would be unwise. So far the pressure for special legislation toward this end has been successfully resisted.

On the other hand the most careful thought has been given to the

fundamental principles involved in the problem both by President Bowman's committee and by the Selective Service administrators. Bulletins have been sent out at frequent intervals to the five thousand addresses which cover the major educational institutions through the country, and special bulletins have been prepared for the guidance of the local Selective Service boards.

I want to quote from a bulletin sent out by the National Headquarters of the Selective Service System on February 21, 1941, signed by General Lewis B. Hershey: "The national industrial training program can be protected from unnecessary interruptions by carrying out, with a due regard for the acute national need for such training, the intent of that phrase in Paragraph 352a which provides for the deferment of those '*in preparation or training*' for a necessary occupation in an activity necessary to the national interest."

Deferment Urged for Students

Granting that this principle is to be recognized we then have to determine the groups in which it is most necessary to speed up training at the present time. Bulletin No. 11 on Higher Education and National Defense, dated April 24, 1941 has an interesting statement on this point. It contains a memorandum sent out to the State Directors of the Selective Service on April 21st by Brigadier General Hershey, who is Deputy Director of the Selective Service System. In this memorandum General Hershey presents a letter which he has received from the Associate Director of the Office of Production Management. The letter is as follows: "From studies which I have asked the Bureau of Labor Statistics to make, I conclude that the supply of manpower in the specialized profession fields listed below, which have a definite and direct relationship to the national defense program, is at a dangerously low level. It is necessary that this level be raised by every means within our power. Certainly the flow of trained graduates into these fields should not be unnecessarily interrupted by any action of any agency of Government. It is my conclusion that the national interest requires that students be encouraged to continue their education in these fields and that the principle of occupational deferment under the Selective Service program may be used to assure their future availability to all activities relating directly or indirectly to the national defense program.

"The Bureau of Labor Statistics has been represented at various conferences in discussing this general problem and has, on its own

initiative, interviewed responsible people important in the special branches of the professions, with a view to getting a cross section of opinion on the matter. It is reported that the uncertainties arising from the attitudes of local draft boards have already affected the registration of students for graduate work in the professional fields. *Therefore, it is urgently recommended that the most serious consideration be given by the Selective Service System to the individual occupational deferment of students in the following courses, so long as they continue to be in preparation or training as necessary men in activities necessary to the national defense:*

Chemistry

Engineering

Civil

Electrical

Chemical

Mining and Metallurgical

Mechanical

"The above occupations have been especially studied by the Bureau and a *dangerously low level of manpower is found to exist therein*. Therefore, the immediate attention of Selective Service is requested to the problem preventing any unnecessary increase of these shortages so that the national defense program will not be impeded unnecessarily.

"The following are professional occupations in which authorities allege that a shortage will exist, but which have not yet been studied by the Bureau. However, there is complete agreement among representatives of industry, of American colleges and universities, and of the practicing professional groups that the present and future demands of the national defense program for college-trained scientific personnel will transcend the normal supply of graduating students that comes onto the labor market at the close of the academic year.

Engineering

Biology and Bacteriology

Agricultural

Geology

Sanitary

Geo-Physics

Dentistry

Meteorology

Pharmacy

Hydrology

Physics

Cartography

Medicine

"The result of further research, as it becomes available, will be transmitted to you as a supplement to this present report".

The real test of the operation of the Selective Service system in

this respect will come during the next three months. Many of the boards are getting well along in their lists and the deferments which have been granted many students to finish the present college year will expire. There is every reason, however, to believe that the present policy will solve this problem in a satisfactory way.

University Students in Great Britain

It is interesting to see what has happened in Britain. The same situation there had to be met two years ago. On May second, President Conant of Harvard University addressed the American Council on Education on the subject "British Universities and the War". In this address he had an interesting comment to make on this point: "Thanks to the 'Reserved Occupations' and the central register, the scientists of Great Britain are now to a surprising degree mobilized for national service. Physicists, engineers, chemists as well as doctors are at work where they are most needed. If men in these professions had been allowed to volunteer at the start, or had been drafted, the shortage today would be very serious indeed. One wonders whether we in the United States will be far-sighted enough to profit by the example. The question touches both our national defense and the continuation in time of dire emergency of our centers of advanced teaching and research.

"It is now clearly evident that the British Government was far-sighted in developing the idea of 'reserved occupations' before the war. The first schedule of these occupations of January 1939, listed a thousand or more categories of employment which were then regarded as essential to the defense of the country. These included a dozen or so categories involving university-trained men. Each category was assigned an age-limit. Men above this age were 'reserved'; that is, these men were only permitted to volunteer for restricted classifications of war services. Some categories had no age limit; for example, all doctors were reserved; physicists were reserved above the age of twenty-five; university and secondary school teachers above the same age, and chemists above twenty-one. The result of this original plan was in effect an over-reservation in many occupations. Frequent modifications in the Schedule since then have been made.

"The schedule is about to undergo still another revision. In many occupations the age limit is being raised, since experience now shows that, on balance, the needs of the fighting services are more important

for the national effort than the particular occupations in question. For example, the age for school teachers and university professors is being raised from the original of twenty-five to thirty-five. On the other hand, the age limit on physicists who have proved of the utmost importance to 'war work', has been lowered from twenty-five to twenty-one."

Now for the third and final problem which faces the universities. If the Selective Service will let us keep our students, what are we going to do with them? What is the most effective way of training them to do the most good in the present emergency? Do we want to try to compress the work for a Bachelor of Chemistry degree from four to two years? Do we want to cut down the period of training for a Ph.D. from three years to one and a half? If we are to speed up training, how much shall standards be permitted to suffer? The answers to questions of this sort are most pertinent for THE AMERICAN INSTITUTE OF CHEMISTS to consider.

Our first reaction may be that in the time of an emergency, standards go by the board, but that is only a half-truth. It depends on what we mean by standards. True, red tape and formalism are frequently shoved aside in an emergency and young men skip up the ladder several rungs at a time. In the rush and confusion, poor training behind a false front may masquerade for a while in a position of authority. But there is present in an emergency, diffused through every field of activity, the force of the necessity of facing bare facts; facing them forcefully, intelligently and honestly. There may not be as much of a need for requiring a man to have a doctor's degree but there are twice as many reasons for requiring him to be a good chemist.

Emergency is an Increase in Social Pressure

One may think of an emergency as a kind of increase in social pressure so that the processes and reactions between units both small and great in our social-economic system are speeded up to kinetic velocities unthought of in normal times. Something like this is bound to affect our concept of what a chemist is and what part he plays in the social and economic structure. If we want to push the analogy a little further we may conclude that the destiny of the chemist is being shaped by the forces which control the evolution of society and that these forces must follow out their course under the laws of social evolution, laws which are as inviolate as the laws of thermodynamics. And

in this "spontaneous process", although we cannot go contrary to the "social free energy" involved, I believe that there is still a rôle for a catalyst; that in the development of chemistry as a vital part of civilization THE AMERICAN INSTITUTE OF CHEMISTS can play a significant catalytic rôle.

Therefore I ask you to consider the ways by which the training of chemists may be shortened. We have to recognize first of all that to be a chemist requires something more than the reading of ten standard textbooks and the performing of one hundred and fifty laboratory experiments. We also recognize that ability can never be expressed in terms of academic credits.

Qualifications of a Chemist

Definitions are dangerous but, I should like to risk one, and try to state the qualifications of a chemist under four heads:

1. A familiarity with chemical facts.
2. A discipline of the hands in laboratory manipulation.
3. A discipline of the mind in the patterns of chemical thinking.
4. An instinct for ways to get things done—call it chemical, engineering or just scientific if you wish.

As we go down this list the speed in training becomes point by point progressively more difficult. We can compress the ten textbooks and one hundred and fifty experiments into half the time it takes now or even less. By some helpful pruning of material in laboratory courses and emphasis in the right places, we might speed up the attainment of skill in laboratory manipulation. But when it comes to accelerating the acquirement of skill in chemical thinking or the development of chemical instinct, we must shake our heads.

If then, we cannot speed up the development of these vital qualities the only alternative seems to be to go out and look for the boys who are "born chemists", for the boys who have a head start by possessing native ability along chemical lines as a God given gift. So far as I know, this is still an untried means of producing more chemists in a hurry and it is worth considering.

Perhaps you don't believe in born chemists, many psychologists apparently do not. But as a matter of practical experience I am firmly convinced that among a hundred students entering a freshmen chemistry course, the natural ability to do chemical things varies at least tenfold. I should be interested to know to what extent those of you who have seen men develop in industrial laboratories agree with me on this figure.

It is quite true that men who have the facility rapidly to acquire knowledge and skill often end up washing test tubes for the man who learned chemistry the slow and hard way. Nevertheless, I still believe that there are boys who possess innate scientific ability plus all around poise and discipline of character. And I believe that these boys can be trained as captains in the chemical army in a time much shorter than the period which we now consider normal.

In conclusion I want to stress one more point. Our admission that poise and discipline and breadth are of equal importance with chemical facility brings us to the heart of the professional aspect of the chemist. The new standard dictionary states that "a profession is an occupation that properly involves a liberal education or its equivalent, and mental rather than manual labor. Hence any calling or occupation involving special mental or other attainments or special discipline as editing, acting, engineering, authorship, etc." It is hard to see how chemistry can be brought into the professional fold, if we insist that no manual labor be involved. But for that matter I would like to ask the author of that definition why he thinks there is no manual labor in engineering. And as far as I am concerned there is a great deal of manual labor in authorship. However, the part of the definition which bears most on this discussion is "a profession is an occupation that properly involves a liberal education."

Activities of the Professional Chemist

When we assert that the activities of a professional chemist involve a liberal education we establish at once certain lines by which we can set apart the professional chemist from all the other people who are connected with chemistry in one capacity or another, all the way from the nightwatchman at the gate to the man in the chair at the head of the directors' table.

A professional chemist may be performing research but he is more than an apparatus operator. He may play a part in manufacturing chemical products but he is more than an artisan. He may be engaged in business but he is more than a tradesman. He may apply chemistry to the service of medicine, metallurgy or any other field, but he is more than a technician. If he is really practicing his profession, he is constantly aware of and guided by principles rather than rules. He is in contact on the one hand with the laws of chemistry and on the other, depending on his particular job, with the laws of physics, of

engineering, of economics, of biology, and above all with the inexorable laws of the behavior of human beings individually and *en masse*. It is his special discipline in chemistry coupled with a liberal understanding of the larger world that enables him to fulfill the function of his profession.

In his essay on "Man the Technician" the Spanish philosopher Ortega y Gasset writes: "I wish it would dawn upon engineers that, in order to be an engineer it is not enough to be an engineer. While they are minding their own business, history may be pulling away the ground from under their feet".

It is on this conception of the professional chemist that the pressure of the emergency bears down with greatest weight. If the period of training has to be shortened, the liberal subjects in the curriculum will suffer the most pruning. It is therefore doubly important that we keep the ideals of the profession vividly before us.

The concept of the professional chemist has its roots in the whole fundamental structure of those ideals which are the basis of our civilization. This we believe with most intense conviction. Our faith in the profession of chemistry is coupled with our faith in the dignity of the individual man and the belief that society as a whole can only prosper when the individual is not a soulless cog in a machine. We affirm that the chemist must be a man with recognized individual rights and responsibilities, with a code of conduct, with a standard of ability and of technical skill, and finally above all a man with a broad understanding for dealing with the larger scientific, economic, and social world in which he lives and moves and has his being. We join the ranks in the world wide battle for liberty and we will not falter or fail until it is won.



It was necessary to omit some of the usual departmental material from this issue of THE CHEMIST, in order to include the proceedings of the Annual Meeting. The September issue will include the omissions together with some excellent new material. The October issue will contain the membership list of THE INSTITUTE, as announced on page 178.

Annual Meeting Reports

Report of the Secretary
for the year ending April 30, 1941

I am pleased to submit this report of the activities of THE AMERICAN INSTITUTE OF CHEMISTS during the season 1940-41.

The National Council held nine meetings during the year with an average attendance of eleven councilors.

The following actions upon the membership were taken:

Resignations	49
Dropped	11
Deceased	13
Total loss in membership	73
Total increase	94
Total decrease	73
Net increase in membership	21

Elections

Fellows	45
Associates	14
Juniors	33
Students	2
Total	94

Actions

Fellows to Life Members	2
Associates to Fellows	25
Juniors to Fellows	2
Juniors to Associate	1
Student to Associate	1

Loss of Membership

Resignations

Fellows	41
Associates	1
Juniors	7
Students	0
Total	49

Dropped

Fellows	4
Associates	4
Juniors	3
Total	11

Deceased

Honorary Members	1
Life Members	1
Fellows	10
Associates	1
Total	13

Membership

May 1940 May 1941

Honorary Members ..	7	5
Life Members	7	9
Fellows	1332	1346
Associates	114	100
Juniors	166	186
Students	8	9
	1634	1655

I regret to make note of the following deaths during the season:

Honorary Member

William Wallace Buffum

Life Member

Edward Carl Uhlig

Medalist

James Flack Norris

Fellows

Paul de Meritt Buckminster
William G. Crockett
Carleton Ellis
Wolf Kritchevsky
Karl R. Lindfors
James Harvey Ransom
Jere K. Ross
Ludwig Saarbach
John A. Schaeffer
Albert M. Smoot

Associate

Luciano L. Blancaflor

While the increase in membership during this year is not as great as it was during the previous year, due chiefly to the present economic conditions, the membership is the largest in the history of the INSTITUTE, and a noticeable increase of interest in the

INSTITUTE upon the part of its members is a most encouraging sign for its future growth and for its increasing value to chemists and to the chemical profession.

The reports of the president, the treasurer, the various committees and chapters and of the editor of THE CHEMIST cover the chief activities of the INSTITUTE during the past year and need not be included in this report.

I again wish to express my deep appreciation to my assistant, Miss V. F. Kimball for her valuable, loyal, and conscientious service to me as secretary, and her capable and successful management of THE CHEMIST as its editor deserve the highest commendation of the members of the INSTITUTE.

Howard S. Neiman, Secretary.

Report of the Committee on Economic Welfare

A meeting of the Committee on Economic Welfare was held at The Chemists' Club on the evening of May ninth.

Dr. Fisher, president of THE AMERICAN INSTITUTE OF CHEMISTS, attended, with Dr. Shepard. Dr. Marston L. Hamlin, of the Barrett Company, kindly consented to join us. The other members of the Committee, Dr. Anderson, Dr. Aycock, Dr. Beegle, and Dr. Carpenter, were unable to come.

Dr. Fisher stated that the plans of the INSTITUTE regarding the nature of this Committee had not been definitely formulated, but it was becoming apparent that there was a large field of investigation open to us and it would be impossible for a Committee to make a full study of the subject.

We discussed the plan of giving a grant to a University Professor, prefer-

ably a man interested in economics, who can give us information regarding the place of the chemist in the economic system of the country, and he might also study the economic aspects of science and its impact on human welfare. We would like to find the place of the chemist in the economic system, and we must learn more about the contributions which chemists and chemistry are making to our civilization.

It was suggested by Dr. Fisher that an institution like the Rockefeller Foundation or perhaps some University could be endowed to the extent of carrying on this work for a number of years until sufficient information was available to enable us to draw some conclusions. Later Dr. Fisher wrote that it might be of interest to approach the Russell Sage Foundation as this organization is well equipped to handle this type of work and has made it a point to carry on such activities.

The interest of Dr. Conant in the welfare of the chemist was also mentioned and there was a possibility that he might have some suggestions.

It was believed that THE AMERICAN INSTITUTE OF CHEMISTS would not be able to sponsor this work without contributions from individuals who were interested in this study and might help in financing such a study.

Dr. Hamlin's report was read and considerable discussion was based upon this report.

A number of ideas were mentioned which would be of definite interest. For example, a code of ethics for chemists would be a valuable contribution from this Committee; a further study of Dr. White's report; Dr. Shepard also mentioned the effect on the chemist of the retirement plans adopted by a number of industries.

Further work should also be done in connection with the selection and training of students for the chemical pro-

fession. It is believed that Universities can be of great assistance in classifying students and possibly in limiting the number of students who are allowed to take certain graduate work in chemistry.

It was also hoped that further study would be given to the place of the chemist in industrial organizations, his relation to the management and his responsibilities to his profession. The salaries of chemists in comparison with other professional men such as lawyers, engineers, and business executives should also be investigated. A study of the salaries of chemists in industrial concerns was recently made by the Industrial Research Institute, and it might be possible that this information could be made available to this Committee.

Dr. Hamlin has also agreed to contribute a copy of his report to be attached to the report of the Committee on Economic Welfare.

Charles N. Frey, Chairman.

Report of the Membership Committee

The Membership Committee of the INSTITUTE is made up of the following chairman of regional membership committees.

Dr. Addison C. Angus, Philadelphia, Pennsylvania.

Dr. T. K. Cleveland, Berkeley, California.

Dr. George H. Coleman, Iowa City, Iowa.

Dr. M. L. Crossley, Bound Brook, New Jersey.

Dr. A. L. Taylor, Brooklyn, New York.

Dr. C. R. Hoover, Middletown, Connecticut.

Dr. B. Smith Hopkins, Urbana, Illinois.

Dean Townes R. Leigh, Gainesville, Florida.

Dr. Norris W. Matthews, Baltimore, Maryland.

Dr. W. O. Milligan, Houston, Texas.

Dr. Carl Rasch, Tonawanda, New York.

These chairmen have formed their own committees and have worked through them in bringing the INSTITUTE and its aims and objectives to the attention of properly qualified members of the chemical profession. Many letters

have been written and personal interviews held and the INSTITUTE has become much better known in a more direct and intimate way than at any time in the past.

The Membership Committee recommends that efforts be made to establish more local chapters in order that members of the INSTITUTE may be able to work more effectively in carrying on

those projects that are of special professional importance.

The work of this committee would be much more effective if members of the INSTITUTE would take the initiative in recommending the INSTITUTE to those chemists who are specially qualified and interested in what the organization stands for and is working to accomplish. W. T. Read, Chairman.

Report of the Auditor

In accordance with your instructions, I have audited your books and records for the fiscal year ended April 30, 1941, and submit herewith a balance sheet as at that date, together with a statement of Income and Expenses for the year and a statement of Cash Receipts and Disbursements.

Cash in the Public National Bank was verified by reconciliation with the bank statement and satisfactory vouchers were presented for all items under audit. There was transferred to the Emigrant Savings Bank an amount of \$2500.00 as a reserve fund, which together with interest earned, totaled \$2521.92 on April 30, 1941. Dues receivable from members for the current and prior years amounted to \$3602.00 against which there was provided an arbitrary reserve of fifty per cent for bad and delinquent accounts.

The excess of income over expenses for the entire year amounted to \$569.82. This compares with a net income of \$2619.38 for the preceding year and

\$387.16 for the year ended April 30, 1939. Included in the net income is an amount of \$6.65 which represents the net profit on the publication of THE CHEMIST.

The surplus account on April 30, 1941 was \$5309.29 and reflects an increase of \$569.82 for the year. This increase is the amount as shown in the schedule of income and expenses.

Your total membership increased from 1634 on April 30, 1940 to 1655 on April 30, 1941 as indicated by the schedule of membership changes.

In my opinion, the balance sheet submitted herewith, and the related statements of income and expenses together with accompanying schedules, correctly present the financial position of THE AMERICAN INSTITUTE OF CHEMISTS on April 30, 1941, and are in accordance with the books and records.

Respectfully submitted,

Jacob A. Lichtenfeld,
Certified Public Accountant.

Report of the Treasurer
SCHEDULE OF INCOME AND EXPENSES
FOR THE YEAR ENDED APRIL 30, 1941

INCOME

Members Dues, 1940-41	\$6,705.50
Less Reserve for Chapter Refunds	445.96
<i>Net Income from Dues</i>	<i>\$6,259.54</i>
<i>The Chemist Publication</i>	
Income from Advertising	\$ 609.75
Income from Subscriptions	2,653.84
Gross Income	\$3,263.59
Less Cost of Publication	3,256.94
<i>Net Income from THE CHEMIST</i>	<i>\$ 6.65</i>
Contribution	20.00
Annual Dinner (1940)	6.00
Interest on Bank Balance (Emigrant)	21.92
<i>Total Gross Income for the Year</i>	<i>\$6,314.11</i>

EXPENSES

Salaries	\$2,610.84
Rent	600.00
Light	27.84
Stationery and Printing	366.72
Postage	364.66
Secretary Expenses	19.00
Membership Expenses	111.56
Telephone and Telegraph	135.35
Social Security Taxes	25.27
Occupancy Taxes	1.00
Council Expenses	75.75
Accounting	137.50
Annual Meeting Expenses	339.34
Medals	82.42
Contributions, Chemist Advisory Council	400.00
Treasurer's Bond	12.50
Washington Chapter Survey	25.00
Delinquent Accounts Written Off	387.50
General Expenses	22.04
<i>Total Expenses for Year</i>	<i>\$5,744.29</i>
NET INCOME FOR YEAR ENDED APRIL 30, 1941	<i>\$ 569.82</i>

Report of the Committee on National Legislation Affecting Chemists

While there has been considerable discussion, and several bills have been introduced into Congress which would affect chemists such as statutory promotions for those upon Civil Service, changes in the pension system, etc., only one bill actually became a law. The bill to which I refer is Public Document No. 880 of the 76th Congress, H. R. 960, An Act Extending the Classified Executive Civil Service of the United States. In substance this bill authorized the President by Executive order to cover into the classified civil service any offices or positions in or under an executive department, independent establishment, or other agency of the Government: provided, that in the case of any federally owned and controlled corporation organized under the laws of any State, Territory, or possession of the United States (including the Philippine Islands), or the District of Columbia, the President is authorized to direct that such action be taken as will permit appointment to offices or positions in any such corporation to be made in accordance with the civil-service laws, consistently with the laws of any such State, Territory, or possession, or the District of Columbia, or with the charter or articles of incorporation of any such corporation. Provided further, that the provisions of this section shall not apply to offices or positions in the Tennessee Valley Authority or to any positions in the Work Projects Administration or to any position to which appointments are made by the President by and with the advice and consent of the Senate, or to positions of assistant United States district attorney.

Sec. 2. (a) The incumbent of any office or position which is covered into the classified civil service under the provisions of section 1 of this Act shall not thereby acquire a classified civil-service status, except (1) upon recommendation by the head of the agency concerned within one year after such office or position has been covered into the classified civil service, and certification within such period by such head to the Civil Service Commission that such incumbent has served with merit for not less than six months immediately prior to the date such office or position was covered into the classified civil service; and (2) upon passing such suitable noncompetitive examination as the Commission may prescribe; provided, that any such incumbent shall be given only one such noncompetitive examination; provided further, that any such incumbent who fails to pass the noncompetitive examination provided in his case shall be separated from the service not later than six months after the Commission advises the appointing officer that such employee has failed.

The Act shall not apply to the Postal Service, offices or positions of teachers, librarians, school-attendance officers, employees of the community-center department under the Board of Education of the District of Columbia, the Metropolitan Police, the Fire Department of the District of Columbia, the United States Park Police, commissioned officers and enlisted personnel in the military and naval services and the Coast Guard, commissioned officers in the Public Health Service and the Coast and Geodetic Survey, positions in

the Government Printing Office, positions of foreign-service officers in the Foreign Service of the United States, certain positions in the Customs Service of the Treasury Department, certain positions in the Immigration and Naturalization Service of the Department of Labor, certain members of the crew of a vessel, and certain other positions including those under

the Tennessee Valley Authority.

As will be noted under the Act, a large number of positions in the many agencies which have been established during the past several years will come in under the classified service. Many of these agencies employ chemists among their personnel.

Henry G. Knight, Chairman.

Report of the Committee on Unemployment

During the past twelve months of changing conditions, unemployment among chemists has considerably decreased. The industry is continuously searching for technical men with highly specialized qualifications to handle emergency problems created, due to the National Defense Program. However, one should not overlook the very serious situation confronting chemists who have not yet been absorbed by these increased activities. This may be due to a particular combination of specifications required for chemical production, or restrictions placed by the industry with reference to age, education, experience, and general personal qualifications.

The Committee on Unemployment of THE AMERICAN INSTITUTE OF CHEMISTS, therefore, earnestly recommends that the INSTITUTE should begin a study of personnel problems in our profession by securing fundamental facts relative to the normal supply and demand of chemists, together with the number of chemical technicians added to the industry due to the present abnormal needs. This can be accomplished by promoting the work of the Chemist Advisory Council. Close observation of individual problems presented every day to the Council substantiates the

fact that there are at the present time men and women in our profession without employment who need assistance. On the other hand, the experience records of these registrants do not fulfill the requirements needed for vacancies reported to the Council. These and other important problems in technological unemployment will have to be faced by the INSTITUTE.

The task of classification and reclassification of chemists during peace time will no doubt depend, more than it ever has before, upon the definition of "a chemist". The INSTITUTE should lead in establishing clear-cut standards in distinguishing a chemist from a technician. The classification of services which a chemist renders to the profession is also very essential. Here again, one should note that the qualifications established by the Chemist Advisory Council for its registration of chemists and chemical engineers would be very helpful in arriving at a workable solution for this very important problem.

Local cooperating committees now established by the Chemist Advisory Council all over the country should secure statistical data covering the character of local industries, research institutions, etc., and the approximate

normal number of chemists required for same. The Advisory Council should receive these fundamental facts and classify them according to standards established by the INSTITUTE. Such a constructive program will be an aid in maintaining the standards of the profession. Intelligent and timely guidance will no doubt maintain the morale of those unemployed and in need.

The present decrease in unemployment in the chemical profession should not be an influence towards lack of interest in the vital professional problems which are presented. It is important, therefore, that one should take advantage of the improved circumstances due to defense activities and support a program which will be helpful in time of need and distress. Such a program has been already undertaken by Chemist Advisory Council and sponsored by THE AMERICAN INSTITUTE OF CHEMISTS. These activities can be efficiently handled if every employed chemist contributes a small amount—as little

as \$1.00 per year—to the Advisory Council. The success of such an attempt will no doubt depend upon education and publicity, which again requires financial support for an universal appeal. The Committee on Unemployment urges the INSTITUTE to endeavor its utmost in encouraging its members to subscribe to the work of the Council.

Attention of the members of THE AMERICAN INSTITUTE OF CHEMISTS is called to a report by the Secretary of Chemist Advisory Council, published in the February, 1941 issue of THE CHEMIST, and an appropriate editorial by the Editor of THE CHEMIST in the same issue.

The Committee on Unemployment would appreciate receiving comments and suggestions which will be helpful in working on a number of professional problems which will arise during the present emergency and, in time of peace thereafter.

E. R. Allen, Chairman.

Report of the Committee on Ethics

During the past year your Committee on Ethics has had occasion to consider the case of one member of the INSTITUTE whose ethical practices have been brought into question by reason of certain display advertising in which his work was involved.

Your Committee has examined in detail all of the printed matter and all available evidence from other sources in connection with the case. After due and careful consideration they recom-

mended that no action be taken at the present time.

Your Committee further commends the Council for its recent enactment requiring prepublication of names of all prospective members prior to their election to membership, and trust that this enactment will materially reduce the probability of future cases such as it has had in consideration for the past year.

W. D. Turner, Chairman.

Report of the Committee on Inter-Relations

The Inter-relations Committee of the INSTITUTE was set up in 1939 to consider questions of dissatisfaction amongst the membership. During its two years of existence the Committee has investigated such questions, carrying on its work largely by correspondence with members who had submitted resignations.

Your Committee finds that there is no widespread dissatisfaction amongst the membership and that the relatively few resignations sent in seem no more numerous than in other professional organizations.

A few resignations were caused by adverse financial circumstances which made the dues a burden. Several were due to disagreement with the INSTITUTE's licensing program. However, most of the resignations were from

members who stated there was no tangible return for dues paid. Since practically all the latter resided in regions where there were no chapters, the basis of the statement is obvious.

To meet this situation, your Committee urges that chapters be organized more rapidly. The talks arranged by a chapter not only offer tangible evidence of return for dues paid, but more important a chapter is a focal point for the membership, licensing, ethics, employment and other professional work of the INSTITUTE in the locality. Indeed the Committee feels some of the dissident members are dissatisfied because they have nothing to do.

There being no further work before the Inter-relations Committee, it recommends its own discharge.

Charles A. Marlies, Chairman.

Report of the Editor of the Chemist

This year about twenty-five contributing editors were selected, on the basis of their location in various sections of the country, to increase interest in the activities of chemists outside of the eastern area. This successfully overcame several protests last year that news was confined too closely to the chapter areas and was not sufficiently interesting to members outside of these chapter areas. This increase in news coverage brought us many expressions of interest from all parts of the United States, thanks to the excellent reporting done by these new contributing editors.

The Washington Chapter prepared one of the most outstanding reports which has so far been contributed to the chemical profession, entitled, "A

Partial Survey of the Chemical Profession with Particular Reference to the Washington Chapter of THE AMERICAN INSTITUTE OF CHEMISTS." The general survey of chemists, immediately preceding specific reference to the Washington Chapter, was the first appearance in one report of available material about the chemical profession. The whole survey appeared in the January 1941 issue of THE CHEMIST and brought an unprecedented number of requests for copies of this issue from libraries, individuals, universities and the industries.

A series of articles on "Opportunities for Chemists in the Government Service" by Louis Marshall, started last year, was completed in a recent issue

of THE CHEMIST. This series was popular among universities, which added it to their files on vocational material.

Both the technical press and the national press have cooperated generously on publicity. *The New York Times*, *The New York Herald Tribune*, *The New York Sun*, and *The New York World-Telegram* have included in their columns information sent to them about meetings of the INSTITUTE. We should like particularly to mention the generous cooperation given to INSTITUTE news by *Chemical Industries*, *The Indicator* and *The Oil, Paint and Drug Reporter*. *News Week* has scheduled a news story about this Annual Meeting for the end of May. Science Research Associates

have listed THE CHEMIST each month in their "Vocational Guide".

It has been necessary to print more than the usual number of copies throughout this year to take care of increasing requests for special issues.

We are deeply grateful to the INSTITUTE members who contributed articles, reports, and suggestions to increase the interest of this publication; to Dr. Harry L. Fisher for his contributions and encouragement; to Dr. William Howlett Gardner for his constructive cooperation; to the Chapter Secretaries and News Reporters for their coverage of chapter activities; and especially to Secretary Neiman for his generous assistance and guidance.

V. F. Kimball, Editor.

Report of the New York Chapter

The New York Chapter has had a very successful year, as characterized by the attendance at the meetings and by the activities of the various committees.

Meetings

Four meetings were held at the Chemists' Club. At each, there was a capacity attendance of members and guests.

A testimonial dinner was tendered to Howard S. Neiman, secretary of the INSTITUTE, on November first. More than one hundred and fifty guests including many very prominent chemists attended the dinner and reception to pay tribute to Mr. Neiman's work in building up our INSTITUTE.

On January seventeenth the chapter had the pleasure of listening to an illustrated lecture by Colonel Marston T. Bogert, which was a very interesting review of the development of our present federal organizations for de-

fense. An extended discussion of this subject followed the meeting where over two hundred and twenty-five members and guests were present.

On February twenty-first, Dr. Richard S. Morse addressed the chapter on "How Vacuum Technology Opens New Fields for Chemists". He described in his talk the use of pressures of approximately 10^{-3} mm, which made it commercially feasible to distill a wide variety of products which have not heretofore lent themselves to such treatment. The meeting was attended by over one hundred members and guests who asked many questions following the talk.

On April fourth, Dr. A. W. Ralston presented an illustrated address on "Chemicals from Fats". He described the increasing importance of fatty acid derivatives in what is becoming a new and rapidly expanding field of chemistry. Over one hundred and twenty-five persons were present including

many prominent chemists who are not members of the INSTITUTE. An invitation had been extended to chemists in general to attend the three meetings at which there was a guest speaker. This gave the chapter an unusual opportunity to acquaint various non-members with the INSTITUTE and our activities. This should assist us in seeking new members in the future. We had very excellent cooperation of the semi-technical press, of various companies, and of educational institutions in announcing these meetings. As a result many chemists became acquainted with the chapter who might not have otherwise learned in detail of our work.

Two additional meetings are also planned for this year. One of these will be the nomination meeting to be held the afternoon of May twenty-third to receive additional nominations for officers and councillors of the chapter. The other will be the final meeting of the year at which the business of the chapter will be reviewed and officers elected. This will take place at an annual dinner upon the evening of May twenty-third. It is to be followed by the presentation of the Student Medals awarded by this chapter for 1941. It is estimated that eleven medals will be presented. Friends of the recipients of the medals will be invited to witness the presentation. Arrangements are also being made for a talk on visual deception.

This series of meetings was planned by the Program Committee, consisting of Messrs. J. Mattiello, R. Baker and D. Price.

The Nominating Committee consisted of R. E. Kirk, chairman, H. G. Lindwall, and E. R. Allen.

Chapter Council

The chapter council, consisting of

Messrs. F. H. Bivins, C. N. Frey, F. S. Granger, D. Price, V. Turkington, and chapter officers, Wm. H. Gardner, W. D. Turner, D. H. Jackson and M. Hamlin, will have held eight meetings at which they have taken a very active part in the wide variety of activities of the chapter besides their regular executive duties. Their advice has been of inestimable assistance to the chairman in organizing and guiding these various activities. The council took a personal part in the general plan for the program for the year and in setting up the various committees, which included the Program Committee, the Membership Committee, the Committee on Professional Problems, one on the Revision of the Constitution and By-Laws, the Nominating Committee and an Auditing Committee. One of the meetings of the council was an emergency meeting held jointly with the Committee on Professional Problems, to consider what urgent assistance could be given the Chemist Advisory Council. This meeting is described in some detail below. Following this meeting each individual member of the Council took a personal part in soliciting donations for the Chemist Advisory Council from members of his own business organization, and in drafting a letter of appeal to members of the chapter.

The final meeting of the council will take place just prior to the National Convention. At this meeting careful consideration will be given to two resolutions. These will be presented to the National Council for approval before adoption at the annual meeting of the chapter on May twenty-third. These will embrace a resolution pointing out the importance to the general public of licensing of chemists, and one disclosing the need for the assignment of chemists who are drafted to various

technical divisions of the Army and Navy.

Committee on Professional Problems

This committee consisting of Messrs. W. J. Murphy, chairman, M. R. Bhagwat, E. Lieber, J. Mattiolo, and A. L. Taylor, was appointed to consider various problems which arose in connection with professional status of chemists. Before they were able to organize and to undertake any of these studies, it was necessary for the chairman to call a joint emergency meeting of the committee and the council of the chapter to ascertain what might be done to assist the Chemist Advisory Council in perpetuating its valuable work. Present at this meeting were also Dean Read, president of the Chemist Advisory Council, and Mr. Breyer, one of its members.

After a brief review of the history of the Chemist Advisory Council, its financial problem was discussed from every angle. Mr. Murphy then volunteered to act as publicity chairman for the Advisory Council and each member present agreed to enlist as many chemists as possible to donate at least \$1.00 to its support. A circular letter addressed to each member of the New York Chapter of the A.I.C. was then drafted. This letter was later reviewed and approved by the chapter council at a further meeting. It was mailed on April twenty-ninth to the individual members of the Chapter. Donations are still being received. The initial returns have been most promising as reported by the secretary of the Chemist Advisory Council.

Membership Committee

The Membership Committee, consisting of Messrs. A. L. Taylor, Chairman, M. Burton, H. F. Payne, K. T. Steik, P. J. Witte, has held four meetings at which they have considered in detail

the entire problem of increasing the membership of THE AMERICAN INSTITUTE OF CHEMISTS. After a very careful review of the lists of names submitted by Dean Read and the invitations which he had extended to these individuals to join the INSTITUTE, the committee came to the unanimous conclusion that only a very limited number of additional members could be obtained in this area by further writing of letters. They therefore next gave careful consideration to the desirability of approaching personally the various prospective members. It was recognized that this method would require the complete coöperation of the entire membership of the chapter, to be really effective. In considering such a method, the committee found that many of the members of the INSTITUTE were none too well informed in regard to the activities of the INSTITUTE. They were not properly qualified therefore to answer questions which might be asked by prospective members.

The committee also noted that there apparently exists active opposition to our INSTITUTE from several different sources, and that some chemists who are not members of the INSTITUTE have gained the impression that our organization is largely a debating society which has accomplished little in regard to gaining recognition for chemists as professional men outside of the government services. An appeal was therefore made to the National Council for assistance in supplying this committee with specific information as to what the INSTITUTE is doing precisely at the present time in this regard. On the basis of what information could be assembled a circular letter addressed to the individual members of the chapter has been prepared. This letter is awaiting the advice and approval of the chapter council at their next meeting. The

letter, besides reviewing the professional activities of the INSTITUTE, asks for the individual coöperation of each member in submitting names of prospective candidates. It also asks for their active coöperation in approaching these individuals.

Although only a very limited number of new members have been acquired this year, we feel that we have laid the basis for a new method of approach which should show very concrete results during the coming year. Any membership drive of this type will naturally be greatly enhanced by any publicity of the activities of the National organization. "THE CHEMIST" is one of the most important aids which we have in securing new members. It is the feeling of this committee that greater assistance should be given to Miss Kimball in obtaining suitable copy for subjects of immediate professional interest to chemists, and that this organ should contain more detailed description of the activities of the INSTITUTE, especially those having to do with professional status of chemists. The feeling prevails among members of this committee and others, that unless a more active and aggressive stand is taken by the INSTITUTE, we are eventually going to lose out to labor unions in their present attempts to organize chemists. A typical example of their success in organizing professional fields is that of journalism.

Committee for the Revision of the Constitution and By-laws

The by-laws of the chapter have not been reviewed since 1933. Two questions arose during the year as to their proper interpretation. This led to the appointment of a committee consisting of Messrs. M. Hamlin, C. S. Reeves, and F. W. Zons. This committee has completely reviewed the constitution

and by-laws of the chapter and has prepared a new document which embraces all the essential features of the present laws but presents it in greatly simplified form. The proposed constitution and by-laws will be presented to the chapter at the annual meeting on May twenty-third. No action on this will probably be taken until next year.

Expenditures

Although the indicated expenditures for the year are to some extent in excess of those of previous years, it is the feeling of the chairman that this has been justified in view of the increased publicity which the activities of the New York Chapter have received. An Auditing Committee consisting of Messrs. C. W. Murphy, Chairman, and M. Toch, has been appointed to review the books for the fiscal year ending April thirtieth.

Acknowledgment

The chairman wishes to take this opportunity to express his appreciation for the honor the New York Chapter has bestowed upon him, and for the excellent coöperation of each individual member in carrying out his duties. The members of the chapter council and of the committees especially, have given freely of their time, energy and thought to the success of the chapter throughout the year. No one need thus fear for the future of either the INSTITUTE or the chapter so long as such whole-hearted enthusiasm exists. It has indeed been a pleasure to have worked closely with so many of the members. In a like manner, it has been a great privilege to have been associated with the National officers and National Council. The invitation to the chairman to attend the National Council meetings was both an honor and a pleasure.

Wm. Howlett Gardner, Chairman.

Report of Pennsylvania Chapter

The Pennsylvania Chapter has enjoyed a very successful year. Thus far six evening meetings have been held, with one more scheduled for May twenty-seventh. Following is a list of dates, speakers, and their subjects:

1. October twenty-ninth, Colonel Joseph C. King. "The Professional Chemist and the Selective Service Act".

2. November twenty-sixth. Dr. G. P. Harnwell. "Nuclear Reaction".

3. January twenty-eighth. Dr. J. C. Geniesse. "Recent Developments in Petroleum, Fuels, and Lubricants".

4. February twenty-fifth. Mr. H. W. Field and Dr. Gilbert E. Seil, leaders. "A Round Table Discussion of the Methods of Organizing and Applying Research".

5. March twenty-fifth. Dr. Earl W. Florsdorf. "The Preparation of Blood Substitutes and Other Biological Materials in Stable Form by Desiccation from the Frozen State".

6. April twenty-ninth. Dr. Harry L. Fisher. "A Message from the President". Mr. H. P. Billings and Dr. E. L. Haenisch, leaders. "Selection and Training the Employee in Chemical Industry".

7. May twenty-seventh. Dr. Donnell F. Hewett. "Minerals and National Defense".

This year saw the adoption of a new

plan, that of having the members themselves present short after-dinner talks on some phase of their industrial activity. It was felt that such a plan would do much towards bringing about greater fellowship and aiding new members in becoming better acquainted. The excellent attendance at meetings and the enthusiasm shown attests to the value and efficacy of this innovation.

After-dinner speakers were Dr. Maurice L. Moore of Sharpe and Dohme, Mr. J. M. McIlvain of the Atlantic Refining Co., Mr. Kenneth E. Shull of the Philadelphia Suburban Water Company, Mr. C. W. Rivise, Patent Attorney, Dr. W. F. Faragher of the Catalytic Development Company.

Abstracts of all talks have been published in THE CHEMIST.

A new set of by-laws was submitted by the appropriate committee. This was passed by the local chapter and received the approval of the National Council.

The Pennsylvania Chapter was represented on the Philadelphia Technical Service Committee by Mr. John H. Beltz.

As in the past the year's activities will be brought to a close with an outing at the Oak Terrace Country Club, to be held on June 21st.

Addison C. Angus, Chairman.

Report of the Washington Chapter

The President of the Washington, D. C. Chapter of THE AMERICAN INSTITUTE OF CHEMISTS has held his tenure of office for less than a year; as he was elected to office July 29, 1940. Dr. Martin Leatherman was re-elected Secretary of the Chapter. The other officers elected were L. F. Rader, Jr., Vice President, and L. R. Heiss, Treasurer.

In taking up my duties in August

of last year, I found I was confronted with a certain situation in Washington, D. C., which I knew little about, and that was the migratory movement of many of the Bureau Chemists away from Washington. Practically the whole Advisory Committee moved to the newly established Government Regional Laboratories. My associations in the past with the Washington, D. C.

Chapter as an attendant at meetings led me to believe that the Advisory Committee was one of the most valuable assets to the Chapter and its dissolution could not help but be a handicap of serious consequence. In addition to this loss was to be added the loss of a dozen or more members who had helped to swell the attendance at our meetings of the preceding year.

The secretarial work during the year had been burdensome according to the report which I had received, and I did whatever was necessary to lighten his load, even though my records are perhaps not as complete as those of my predecessor. Both Dr. Leatherman and Mr. Rader have always come to my rescue when seeking points of information on records. Mr. Lundstrom has been able to assist in the formation of committees, and on many other matters coming before the Chapter. To these assistants I owe a debt of gratitude.

The affairs of the Washington Chapter opened for the season with Luncheon Meetings. Two luncheon meetings were held; one on October twenty-second, at Hogates Restaurant with Mr. Fowler Taylor of the Civil Service Commission as the guest speaker. He outlined the work of the Roster Committee of the National Resources Planning Board and asked the Washington Chapter to supply the committee with a roster of the INSTITUTE as an aid in their work.

The second luncheon meeting was held on December tenth at the cafeteria of the Department of Agriculture. Mr. A. J. Kramer of the office of the Solicitor, U. S. Department of Agriculture on the patent policy and procedure in the Department of Agriculture. These Luncheon Meetings were later discontinued because of the difficulty in securing inexpensive premises where they might be held, and also for

the purpose of replacing them by evening social meetings. An additional reason for discontinuing the luncheon meetings was the transfer of about fifteen members to the National Research Center at Beltsville, Md., making luncheon meetings virtually impossible. Decision was made to hold the regular meetings on the first Tuesday of every second month, i.e.; November 5, January 7, March 4, and May 6.

The first meeting was therefore on November fifth. This was a busy meeting as it entailed the appointment of committees and dispatching of new business, the rest of the evening being given over to a talk by a representative of the National Resources Planning Board, Mr. Workmaster, on the subject "Objectives of the Roster of Scientific and Specialized Personnel". The meeting was fairly well attended considering the loss of twenty Bureau Members in the migratory movement already referred to.

The second meeting was that of January seventh. At this meeting as well as the previous one, the members coming over from Baltimore as well as many from Washington dined together at the Wardman Park Hotel prior to the business session. At this second meeting, steps were taken to stimulate the campaign for new members for the INSTITUTE. Dr. Norris W. Matthews of Baltimore had been appointed chairman of the Membership Committee and reported several new names as candidates for membership, and reported progress in the completion of members on this Committee.

The decision to invite THE AMERICAN INSTITUTE OF CHEMISTS to have its Annual Meeting of 1941 in Washington, D. C., was re-affirmed. Plans were also made for a dinner meeting in March, and to make the May meeting a joint one with the national or-

ganization. The Bulow Bill, of great interest to Bureau chemists in regulation of compensations, was discussed, one member, Mr. A. L. Mehring being very active in its promulgation through his association with the Joint Committee of Professional Societies.

The March meeting was given over to an address by our eminent President of the INSTITUTE, Dr. Harry L. Fisher. We were also fortunate in having present the past President, Dr. Robert J. Moore. There was a fairly large attendance at both the dinner and the business session. The illustrated lecture by Dr. Fisher on "Rubber and Modern Plastics" was most enlightening as was also the talk of Dr. Moore on some of the work connected with the Chemist Advisory Council. We also had a few remarks from the President of the New York Chapter, Dr. William Howlett Gardner.

A joint dinner meeting was held April tenth under the direction of Mr. Frank O. Lundstrom with the Washington Section of the American Chemical Society for the purpose of promoting Chemist Advisory Council activities. Mr. Frank G. Breyer, member of the board of the Chemist Advisory Council, as well as Mr. M. R. Bhagwat, its secretary, pepped up the meeting by telling us of the future value of the Council in advancing the welfare of the chemical profession.

Your President has attempted to attend all National Council Meetings in New York, and has missed but few of them. I was fortunate in being able to attend these meetings and they are of value in the coördination of the activities of the National Council with those of the Washington, D. C., Chapter.

The Committee Memberships are as follows:

Advisory Committee: F. O. Lundstrom, chairman; J. B. Edmonds, L.

N. Markwood, J. H. Hibben, J. W. McBurney, A. R. Merz, W. H. Ross, J. F. Williams; the Vice President and Secretary ex-officio.

Membership Committee: N. W. Matthews, chairman; D. H. Andrews, M. S. Anderson, Miss M. A. Rolland.

Student Medal Awards: F. O. Lundstrom, chairman; E. J. Umberger, L. F. Rader, Jr., Miss M. A. Rolland.

Reporter to Chemist: T. H. Tremearne.

Program Committee: L. F. Rader, Jr., chairman.

Committee of Professional Societies for Civil Service Improvement: A. L. Mehring, chairman.

Issues and Objectives Committee: F. O. Lundstrom, chairman; A. L. Mehring, L. F. Rader, Jr., assisted by M. S. Anderson, M. J. Goss, L. N. Markwood, W. N. Noble.

Reception Committee: (For Annual Meeting of the INSTITUTE in Washington, D. C. on May 17) L. F. Rader, Jr., chairman; and about twelve members.

Chemist Advisory Council: F. O. Lundstrom, chairman.

The most constructive undertaking of the Washington Chapter was that of the Issues and Objectives Committee, which made a survey of the chemical profession in Washington, D. C. Under the title of "A Partial Survey of the Chemical Profession with Particular Reference to the Washington Chapter of THE AMERICAN INSTITUTE OF CHEMISTS," this survey was fully published in the January, 1941, issue of THE CHEMIST. The report is an extensive one and covers about thirty pages of that issue. This is most comprehensive survey of its particular kind ever made, and is a valuable reference work.

Albin H. Warth,
President of Washington Chapter.



COUNCIL

OFFICERS

President, Harry L. Fisher
Vice-president, W. T. Read

Secretary, Howard S. Neiman
Treasurer, Walter J. Murphy

COUNCILORS

E. R. ALLEN
DONALD H. ANDREWS
FRANK G. BREYER
GUSTAV EGLOFF

CHARLES N. FREY
JOSEPH W. E. HARRISSON
HENRY G. KNIGHT

ROBERT J. MOORE
NORMAN A. SHEPARD
FOSTER D. SNELL
MAXIMILIAN TOCH

CHAPTER REPRESENTATIVES

<i>New York</i>	<i>Niagara</i>	<i>Philadelphia</i>	<i>Washington</i>
MARSTON L. HAMLIN	A. W. BURWELL	GILBERT E. SEIL	ALBIN H. WARTH

May Meeting

The 180th meeting of the National Council of THE AMERICAN INSTITUTE OF CHEMISTS was held on Saturday, May 17, 1941, at the Wardman Park Hotel, Washington, D. C., at 12:00 o'clock noon.

Dr. Harry L. Fisher presided.

The following officers and councilors were present: Messrs. E. R. Allen, D. H. Andrews, H. L. Fisher, M. L. Hamlin, J. W. E. Harrisson, H. G. Knight, R. J. Moore, W. J. Murphy, H. S. Neiman, W. T. Read, G. E. Seil, N. A. Shepard, M. Toch, and A. R. Warth, Dr. W. H. Gardner, Dr. F. O. Lundstrom, Mr. M. R. Bhagwat and Miss V. F. Kimball were present.

The minutes of the preceding Council meeting were approved.

The Treasurer's report, showing total cash on hand of \$3446.31, with accounts payable of \$454.25, was read and accepted.

Upon motion made and seconded, Dr. H. L. Fisher was appointed as delegate of THE AMERICAN INSTITUTE OF CHEMISTS to the Hundredth Anniversary celebration of Fordham University, to be held in New York, N. Y., September 15, 16, and 17, 1941.

The Secretary announced that the following new councilors had been elected to serve until May 1, 1944; Dr. Ernest R. Bridgwater, Dr. Stuart R. Brinkley, and Dr. F. O. Lundstrom.

Upon motion made and seconded, the student medal awards of the Washington Chapter were approved.

A letter from Dr. Vanderveer Voorhees was read regarding the action of the Chicago Bar Association with reference to patent work for chemists and engineers, and upon motion made and seconded, the president was requested to appoint a committee to consider this subject, and that the committee be requested to cooperate with the committee on patents of The American Chemical Society.

The president appointed the following patent committee: Howard S. Neiman, Maximilian Toch, Gilbert E. Seil, and J. W. E. Harrison.

Two resolutions adopted by the Council of the New York Chapter of THE INSTITUTE were presented for approval by the National Council, and upon motion made and seconded, these resolu-

tions were referred to the June meeting of the Council.

Dr. Toch reported for the Financial Committee.

Upon motion made and seconded, the treasurer was instructed to purchase two \$740.00 defense bonds with funds now in the savings bank, and that he rent a safety deposit box in which they should be placed.

Upon motion made and seconded, the Treasurer was instructed to reimburse Dr. Harry L. Fisher's secretary for work which she has done in connection with correspondence for THE AMERICAN INSTITUTE OF CHEMISTS, in the amount of \$25.00.

There being no further business, adjournment was taken.

CHAPTERS

New York

Chairman, William Howlett Gardner

Vice-chairman, W. D. Turner

Secretary-treasurer, D. H. Jackson

17 John Street

New York, N. Y.

Council Representative, Marston L. Hamlin

New officers for the New York Chapter were elected at the annual meeting of the Chapter on May twenty-third. Dr. Donald Price, technical director of the Organic Research Laboratory of National Oil Products Company, Harrison, N. J., was elected chairman. Dr. Elmore Northey, chemist, Pharmaceutical Division of Calco Chemical Company, Bound Brook, N. J., was elected vice-chairman. Dr. Milton Burton, of New York University was

elected secretary-treasurer. Chapter representative to the National Council, Dr. Marston L. Hamlin of the Barrett Company, was reelected. Chapter councilors elected were Dr. Joseph J. Mattiello, of Hilo Varnish Corporation, Brooklyn, N. Y.; Dr. R. R. Denslow, of E. I. du Pont de Nemours and Company, Newark, N. J., and Dr. Byron L. West of Calco Chemical Company, Bound Brook, N. J.

Niagara

Acting Chairman, Alvin F. Shepard
Secretary-treasurer, Wilbert A. Herrett
109 Norwood Avenue
Hamburg, N. Y.

Council Representative, Arthur W. Burwell
Carl H. Rasch, *Alternate*

News Reporter to THE CHEMIST, Margaret C. Swisher

Pennsylvania

Chairman, Addison C. Angus

Vice-chairman, Edward L. Haenisch

Secretary-treasurer, Harold A. Heiligman
1203 West Oak Street
Norristown, Penna.

Council Representative, Gilbert E. Seil

News Reporter to THE CHEMIST, Kenneth A. Shull

The March meeting of the Pennsylvania Chapter was held at the Christian Association Building of the University of Pennsylvania on Tuesday, the twenty-fifth.

Continuing the present plan of having short after dinner talks, Mr. W. F. Faragher of the Catalytic Production Company discussed the "Catalytic Production of Toluene".

Practically all of the toluene (about 98 per cent) produced in this country is derived from coke oven light oils. With the world again in chaos, resulting in an increased demand for this explosives constituent, new methods have been sought for its production.

At least two thermal processes for obtaining toluene from petroleum were known at the time of the Armistice. But neither was used successfully for mass production.

Recently two plants have been con-

templated to produce toluene by catalytically aromatizing normal paraffins. One of these, operated by the Shell Oil Company, will produce approximately 2,000,000 gallons per year and, if need be, will be capable of turning out 7,000,000 gallons per year.

The main speaker was Dr. Earl W. Florsdorf, professor of bacteriology at the University of Pennsylvania, who described "The Preparation of Blood Substitutes and other Biological materials in Stable Form by Desiccation from the Frozen State".

The manipulation of proteins and similar materials has always presented a difficult problem to the chemist. This is so because of the many hard-to-control reactions which take place—enzymatic, bacterial, etc.

It was early realized that such reactions can only take place in the presence of water and, although Ehrlich

removed water as a means of protein stabilization, it was not until about 1911 that the desiccation of protein containing materials in the frozen state was recognized as a means of removing water which would in no way alter the constitution of the proteins.

Until 1934, this method remained little more than a laboratory curiosity. It did find some little application in the preservation of bacteria. At that time, however, the principle was applied in a practical manner to the aseptic production of human serum and plasma as a blood substitute for transfusions.

Desiccated blood is particularly valuable for this purpose since it is stable without refrigeration, does not require typing, and is available immediately for use upon the addition of sterile water.

This product has found application for all purposes requiring whole blood transfusions and in treatment of shock, particularly under war time conditions.

As a peace time project the method may solve the problems of the small hospital in remote parts of the country where automobile emergencies are ever too frequent.

Dr. Florsdorf performed an experiment to illustrate the method of desiccation in the frozen state. He also showed the various pieces of equipment, and samples of the finished product.

A MEETING of the Pennsylvania Chapter was held at Houston Hall on Tuesday, April twenty-ninth.

In place of the usual after dinner speaker, the Chapter was honored in hearing a short talk by the National President, Dr. Harry L. Fisher. Dr. Fisher discussed the activities of the past year, and briefly sketched some of the plans for the future. Some of the points which he covered were (1) li-

censing of chemists, (2) an economic survey of chemists, (3) professional status of chemists, (4) contracts, (5) student membership, and (6) annual meeting.

The scientific part of the program consisted of a symposium on "Selection and Training the Employee in Chemical Industry". Those taking part were Mr. H. P. Billings, Personnel Department, R. C. A. Manufacturing Company and Dr. E. L. Haenisch, Head of the Chemistry Department at Villanova College. At the conclusion of these talks the meeting was "thrown open" for a general discussion.

Mr. Billings took up the question of what chemical industry expects of the college.

A person seeking a position in the chemical industry should possess the following qualifications.

1. He should have a good sound training in science, with particular emphasis on chemistry, physics, and mathematics.

2. He should be able to express himself clearly and concisely in writing and in speech. (According to Mr. Billings this is one trait lacking in nearly all college graduates).

3. He should have a good personality. (Evident from his participation in extracurricular activities and leadership in organizations.)

4. He should possess a great liking for the particular type of work for which he is applying, and he should be prepared to become a part of the organization.

5. He should have a sense of responsibility.

It is only after a careful analysis of the individual with respect to these several points that his suitability for industry can be determined.

After selection, the employee is frequently given a short training course. This may include a few weeks' instruction in each of the company's departments, so that he may become familiar with all phases of development and production; or he may be apprenticed to the department in which he expects to work.

Dr. Haenisch discussed the problem from the standpoint of what the college expects of industry. The following points were brought out:

1. The American Chemical Society has set up certain standards which all colleges granting degrees in chemistry should strive to attain.

2. Too much emphasis has been placed on teaching the newer theories of chemistry at the expense of fundamentals. It is far better that the student thoroughly understood the theory and mechanism of a pH meter, for example, than to learn to carry out a series of measurements using the push button system. This latter operation can be learned very easily in industry.

3. Students should be taught common sense. Almost anyone can memorize a mass of fundamentals. But the student who becomes a success is the one who is able to apply these principles, by common sense reasoning, to practical problems.

4. There should be a closer correlation between the various courses of chemistry.

5. Chemistry students do not receive enough instruction in composition and public speaking. The blame for this must be passed on to the English department, whose courses consist largely of literature study.

6. Personnel men of the various industries should make known to colleges their reasons for taking or rejecting a student.

May Meeting

THE last meeting of the Pennsylvania Chapter was held at Houston Hall on Tuesday, May twenty-seventh.

At this time the following officers were elected for the coming year.

Chairman, Dr. Edward L. Haenisch, Villanova College. Vice chairman, Mr. J. M. McIlvain, Atlantic Refining Company. Secretary-treasurer, Dr. Clinton W. MacMullen, Rohm & Haas Company. Reporter, Mr. Kenneth E. Shull, Philadelphia Suburban Water Company. Council Representative, Dr. Gilbert E. Seil, E. J. Lavino and Company.

Speakers for the evening were Dr. Gilbert E. Seil, Technical Director, E. J. Lavino and Company, who discussed "The Determination of Crystalline Mineral Formulas by Use of X-ray Diffraction and the Petrographic Microscope", and Dr. Donnell F. Hewett, chief geologist, U. S. Geological Survey, who spoke on "Minerals and National Defense".

Dr. Seil pointed out how "at sea" the organic chemist would be if he were only able to report the amounts of the various elements present in a particular compound. Fortunately he is able to go beyond the empirical structure and actually show in what manner the elements are linked together.

In a great number of cases this also becomes important in the field of inorganic chemistry. As a general rule, however, the inorganic chemist reports the results of an analysis of a calcium carbonate sample, e.g. as containing so much calcium oxide and so much carbon dioxide, with no regard as to whether it is calcite or aragonite. Likewise the analysis of silica gives results in terms of silica, disregarding the fact

that the substance may be either quartzite, tridymite, cristobalite, etc.

By means of X-ray diffraction and the petrographic microscope it is possible to determine the crystalline structure of minerals and thus learn the manner in which the elements are linked together.

Some of the important points gleaned from Dr. Hewett's talk follow:

National resources are divided between agricultural and mineral. Agricultural products are stable and non-exhaustible whereas mineral substances respond to changes in price and are exhaustible.

Strategic materials are defined as those which are essential for national defense and which are not produced domestically at all or in insufficient quantities for defense needs.

Seven of the strategic elements, their principle places of occurrence and essential use follow:

1. Antimony—China and Mexico—Shot, and bearing metal alloys.
2. Chromium—South Rhodesia and British India—Alloys.
3. Manganese—Russia, South Africa, India, United States—Steel and alloys.
4. Mercury—Spain and Italy—Fulminates.
5. Nickel—Canada—Alloy steels.
6. Tin—Federated Malay States, Bolivia, Dutch East Indies—Containers.
7. Tungsten—China, Burma — High speed steels.

Critical materials are those which are essential for national defense and which might be difficult to obtain in adequate quantities. This class includes aluminum, copper, platinum, vanadium, etc.

Dr. Hewett expressed the need for research in developing new and improved methods for refining low grade ores.

K. E. Shull.

NORTHERN LIGHTS

By Howard W. Post, F.A.I.C.

In the months past this column has had much to write about personnel matters in Canadian war efforts, especially as regards chemists and chemical engineers. Now for the first time the whole picture seems to take on a different hue. Heretofore, THE AMERICAN INSTITUTE OF CHEMISTS has been an interested and a friendly spectator. Now we are saying that perhaps we should study Canadian methods for application to our own position.

We learn from *Canadian Chemistry and Process Industries* of the personnel of the board which has been set up under the direction of E. M. Little to supervise the fitting of men into jobs, and probably vice versa as well, in the all out way effort going on north of the border. It is what might be called a

federal or a representative board. As members we find one representative each from The Engineering Institute of Canada, The Canadian Institute of Mining and Metallurgy, The Canadian Institute of Chemistry, The Canadian Manufacturers' Association, the Universities of Canada and the Provincial Professional Associations. Incidentally, the representative of the Canadian Institute of Chemistry is the Editor of *Canadian Chemistry and Process Industries*, Mr. L. E. Westman.

Those of us who are in the teaching game were interested to read that one of the functions of this board will be to interest itself "in the speeding up (of) the training of certain classes of engineering students at Universities."

Chemist Advisory Council Committees

The following heads of Committees in the various States have accepted appointments to work with the Chemist Advisory Council.

Arkansas

Dr. Harrison Hale, Chemistry Building, University of Arkansas, Fayetteville, Arkansas.

California

Dr. A. T. Bawden, Stockton Junior College, Stockton, California.

Mr. H. J. Bensinger, Braun Corporation, 2260 E. 15th Street, Los Angeles, California.

Dr. Paul D. V. Manning, Golden State Company, Ltd., 425 Battery Street, San Francisco, California.

Colorado

Mr. W. L. Conrad, 251 Broadway, Denver, Colorado.

Connecticut

Mr. J. B. Ficklen, The Travelers, Hartford, Connecticut.

Mr. Henry F. Payne, American Cyanamid Company, Stamford, Conn.

District of Columbia

Mr. Frank O. Lundstrom, Bureau of Agricultural Chemistry and Engineering, U. S. Department of Agriculture, Washington, D. C.

Florida

Dean W. S. Anderson, Rollins College, Winter Park, Florida.

Idaho

Dr. Leo M. Christensen, University of Idaho, Moscow, Idaho.

Illinois

Dr. A. M. Buswell, University of Illinois, Urbana, Illinois.

Indiana

Dr. J. L. Bray, Purdue University, Lafayette, Indiana.

Mr. John R. Kuebler, 5503 E. Washington Street, Indianapolis, Indiana.

Iowa

Professor L. Chas. Raiford, State University of Iowa, Iowa City, Iowa.

Professor O. R. Sweeney, Department of Chemical Engineering, Iowa State College, Ames, Iowa.

Mr. George T. Williams, United Light Building, Davenport, Iowa.

Kansas

Professor B. L. Smits, Kansas State College, Manhattan, Kansas.

Dr. J. Willard Hershey, McPherson College, McPherson, Kansas.

Kentucky

Professor R. C. Ernst, University of Louisville, Louisville, Kentucky.

Professor Charles F. Krewson, University of Kentucky, Lexington, Ky.

Louisiana

Professor H. W. Moseley, Tulane University of Louisiana, New Orleans, Louisiana.

Maine

Professor Charles A. Brautlecht, University of Maine, Orono, Maine.

Michigan

Professor C. G. Duncombe, University of Detroit, Detroit, Michigan.

Dean R. C. Huston, Michigan State College, East Lansing, Michigan.

Dr. Chester S. Schoepfle, University of Michigan, Ann Arbor, Michigan.

Dr. William R. Veazey, Dow Chemical Company, Midland, Michigan.

Maryland

Dr. A. H. Warth, Crown Cork and Seal Company, Eastern Avenue and Kresson Street, Baltimore, Maryland.

Minnesota

Professor C. A. Mann, University of Minnesota, Minneapolis, Minnesota.

Missouri

Dr. Harold Brown, University of Kansas City, Kansas City, Missouri.

Dean Harry A. Curtis, College of Engineering, University of Missouri, Columbia, Missouri.

Mr. H. E. Wiedemann, Chemical Building, Saint Louis, Missouri.

Montana

Professor O. E. Sheppard, Montana State College, Bozeman, Montana.

Nebraska

Professor C. S. Hamilton, University of Nebraska, Lincoln, Nebraska.

New Jersey

Dr. Charles P. Smyth, Department of Chemistry, Princeton University, Princeton, New Jersey.

New York

Dr. A. W. Burwell, Alox Corporation, P. O. Box 556, Niagara Falls, New York.

Professor A. W. Davison, Rensselaer Polytechnic Institute, Troy, New York.

North Carolina

Professor Paul Gross, Duke University, Durham, North Carolina.

North Dakota

Dr. Irvin Lavine, University of North Dakota, Grand Forks, North Dakota.

Ohio

Professor H. I. Cramer, University of Akron, Akron, Ohio.

Dr. C. A. Thomas, Monsanto Chemical Company, Dayton, Ohio.

Oregon

Dr. F. A. Gilfillan, Oregon State College, Corvallis, Oregon.

Pennsylvania

Dr. J. E. Cavelti, Allegheny College, Meadville, Pennsylvania.

Dr. William A. Hamor, Mellon Institute, Pittsburgh, Pennsylvania.

Professor H. A. Neville, Lehigh University, Bethlehem, Pennsylvania.

Dr. John L. Parsons, Hammermill Paper Company, Erie, Pennsylvania.

Professor C. C. Wright, Pennsylvania State College, State College, Pa.

Rhode Island

Professor Robert F. Chambers, Brown University, Providence, Rhode Island.

South Carolina

Mr. J. E. Mills, Sonoco Products Company, Hartsville, South Carolina.

Tennessee

Professor J. H. Robertson, University of Tennessee, Knoxville, Tennessee.

Dr. C. B. Weiss, Buckeye Cotton Oil Company, Memphis, Tennessee.

Texas

Mr. R. H. Fash, The Fort Worth Laboratories, P. O. Box 1379, Fort Worth, Texas.

Dr. E. P. Schoch, University of Texas, Bureau of Industrial Chemistry, Austin, Texas.

Utah

Mr. W. L. Latshaw, U. S. Smelting, Refining and Mining Company, Newhouse Building, Salt Lake City, Utah.

Vermont

Professor Clifford S. Leonard, University of Vermont, Burlington, Vt.

Virginia

Dr. Ralph T. K. Cornwell, Sylvania Industrial Corporation, Fredericksburg, Virginia.

Professor F. C. Vilbrandt, Virginia Polytechnic Institute, Blacksburg, Va.

Washington

Professor H. L. Cole, State College of Washington, Pullman, Washington.

West Virginia

Dr. D. J. Beaver, Monsanto Chemical Company, Rubber Service Department, Nitro, West Virginia.

Professor W. A. Koehler, West Virginia University, Morgantown, W. Va.

Wisconsin

Dr. S. F. Darling, Lawrence College, Appleton, Wisconsin.

Professor V. W. Meloche, University of Wisconsin, Madison, Wisconsin.

Dr. J. Vernon Steinle, S. C. Johnson and Son, Inc., Racine, Wisconsin.

Wyoming

Mr. Karl E. Huber, 1523 South Elm Street, Casper, Wyoming.

High Vacuum Technology

By Richard S. Morse

A talk given before a meeting of the New York Chapter of
THE AMERICAN INSTITUTE OF CHEMISTS

In the early part of this century, scientific experts were all in more or less agreement that radio communication with a wave length shorter than 200 meters was an impossibility. After the exhaustive experiments of a few pioneers not only was it demonstrated that phenomenal results could be obtained through the use of the higher frequencies, but also that the foundation was laid for a whole new industry which now embraces the entire field of world-wide communication, television, and more recently the possibility of exploiting so-called "ultra-high frequencies." Although the analogy is by no means a perfect one, it is interesting to compare the development of such an industry, with its attendant opportunities, with the present status of industrial applications of very low pressures—a field which is just beginning to show promise.

It is now relatively common practice

to undertake distillations on a large scale at pressures which are the order of 15 mm. of mercury. Notable advances have for example recently been made in the commercial treatment and fractionation of fatty acids and other high boiling organic materials. Usually one resorts to such a technique in order to facilitate distillation of high boiling materials which can be treated at atmospheric pressures only with difficulty. If, instead of employing a free air pressure of 15 mm., this is still further reduced to 1 mm., there is an approximate further reduction of 30° C. in distillation temperature. If again, substantially all of the residual air—or non-condensable vapors—is eliminated, a still further temperature reduction of nearly 50° C. is obtained. At an air pressure of approximately one micron (10^{-3} mm.) no further reduction in distillation temperature can be achieved by a further reduction of the pressure

with a given type of apparatus. Under such conditions the term, "molecular distillation", or perhaps more appropriately "evaporative distillation", has been applied. It has now been established that with appropriately designed equipment a whole new class of high molecular weight materials, such as the natural oils, fats, and so forth may be distilled without decomposition.

The possibility of performing high vacuum distillations was demonstrated in the laboratory before 1900, and the term, "molecular distillation", appears to have been first applied by Brönsted and Hevesy in 1922 to the method which they used in separating the isotopes of mercury. In this connection it is interesting to note that, in spite of the fact that it is generally assumed that close fractionation cannot be achieved under conditions of high vacuum, one of the first applications was successfully used for the separation of isotopes. Although many workers, both in this country and abroad, have repeatedly demonstrated the successful applications of their high vacuum technique to the treatment of various products, one of the few really successful commercial applications to date has been in connection with the production of vitamin concentrates from natural oils.

High vacuum distillation equipment differs greatly in design from commercial apparatus. The problems involved in maintaining a pressure of 10^{-3} mm. or less are in themselves difficult, to say the least. Although great progress has been made in recent years, particularly with the development of the electronics industry and the demands of the nuclear physicist, a vast amount of work still remains to be done from the point of view of designing large capacity pumps, gauges, and other tools of the high vacuum technologist. When one

operates in this region of pressure, the very question of its measurement alone calls upon the ingenuity of the chemist or physicist.

As an analytical tool, high vacuum distillation appears to offer many possibilities to a modern chemical laboratory. Here at last is the only convenient means of separating many types of high boiling materials in order that the various constituents may be subsequently subjected to analysis. Although the experimental work to date with the conventional types of stills indicates that close fractionation, in the usual sense, cannot be achieved under high vacuum, there certainly is no reason to believe that ultimately this problem cannot also be successfully solved.

At the present time there is little evidence to indicate the successful applications of high vacuum to inorganic materials. Some experimental work has already been done on the processing of steel, glass, and other alloys under low pressure, although generally speaking the technique has been merely one of "outgassing" rather than that of distillation or fractionation. With the increased demand for both reflecting and low reflecting surfaces as produced by high vacuum evaporation, the possibility of distilling minute quantities of such relatively inert substances as aluminum, silver, platinum, rhodium, and metallic fluorides and silicates has been demonstrated. Although it is difficult to imagine how processes of this type could be carried out on a large scale, such a technique does offer an interesting means of studying the general underlying theory of "high vacuum distillation" in the laboratory.

Naturally it is difficult to foresee future commercial applications of this new technique, but at present the rela-

tive expense for such a process appears to indicate its usefulness in the treatment of more expensive materials such as vitamins, essential oils, pharmaceuticals, and so forth. Nevertheless it is very likely that improvements in

the design of large apparatus may permit the large scale economical treatment of drying oils, edible oils, and the whole range of natural fats, waxes, gums, and other products which are normally considered undistillable.

From Our Readers

THE AMERICAN INSTITUTE OF CHEMISTS,
233 Broadway,
New York, N. Y.

Gentlemen:

The other day I sent you my contribution as per your recent request. I noticed afterward that you asked a question, namely, what do individuals think the Advisory Committee should do first?

My opinion is that the first thing that should be done is to define what a chemist is. Obviously there should be more than one classification; thus, supervisor, senior, junior, apprentice, etc. Definitely, however, I feel that the minimum requirement should be four years of collegiate training.

It has been my observation that frequently chemists who have earned the right to enter the profession, at least as a junior, are unable to do so because a lot of corporative chisclers hire high school graduates, teach them some routine manipulations, and call them chemists. Under ordinary circumstances I could see no objection in this provided the supervisor is competent. However, in view of the practical fact that every time this is done somebody is robbed of an opportunity that he has earned and deserves, I think it should be disallowed.

If THE AMERICAN INSTITUTE OF CHEMISTS is ever going to amount to anything, I think it will be by virtue of its having aided chemists as a group to protect themselves against the exploitations of unfair employers and pseudo-chemists. I wish every Fellow of the INSTITUTE would reread the article by Julius Stieglitz, J.A.C.S., 39, 2095-2110, (1917).

Very truly yours,

A Fellow of THE INSTITUTE

Your correspondent raises a number of interesting points on a vital subject and I am glad of an opportunity to comment on them through the medium of THE CHEMIST.

We are in complete agreement on the need of the definition of a chemist; indeed in the writer's opinion the one most important objective of THE AMERICAN INSTITUTE OF CHEMISTS is the establishment of the professional status of the chemists and consequently the definition in question is self evident. However, the fact must not be overlooked that the INSTITUTE has already made a substantial start in this direction in that the requirements for membership as a Fellow constitute the best definition yet attempted. Moreover the writer feels that the classification in

our membership already adopted and subject to much thought and discussion by the National Council, with revisions as necessary, is sufficient and therefore the writer questions the need for the additional classifications suggested by your correspondent.

Every member of the INSTITUTE deprecates the use of the term "chemist" as applied to those inadequately trained or experienced. Nevertheless, the writer wonders if the expression "a lot of corporative chiselers hire high school graduates, teach them some routine manipulations, and call them chemists" is not perhaps something of a distortion in that it suggests the prevalence of such practices. This correspondent's further statement "Under ordinary circumstances I could see no objection in this provided the supervisor is competent." is pertinent in that it suggests unwittingly perhaps an opportunity for the real chemist to provide the proper leadership—this leadership to include the responsibility of defining a chemist—for those endeavoring honestly to participate in this important field. Certainly no member of the INSTITUTE desires to rule out the potential Abraham Lincolns of the profession. The questions might further be raised as to

whether the expressions "robbed of an opportunity" and "should be disallowed" are not more suggestive of craftsmen than of professional men.

The article of reference is most helpful coming as it does from the pen of this great American chemist. Nevertheless this was written nearly a quarter of a century ago, and in the interim much progress has been made, and the writer ventures to suggest that the short-sighted type of employer referred to therein is in the minority at the present time. Recognition is quite general that the most important factor contributing to liberal conditions for work are liberal work itself, and I for one like to think of the work of the INSTITUTE as directed toward defining a chemist, and what is much more important, *establishing* that definition in such a way that there is placed before the potential employer and the public in a dignified way the possibilities of the professionally qualified chemist. When this objective is realized, it is doubtful if it will be necessary for "chemists as a group to protect themselves against the exploitations of unfair employers and pseudo-chemists".

E. R. Allen, F.A.I.C.



Gilbert E. Seil, F.A.I.C., technical director of E. J. Lavino and Company and chairman of the Ferrous Minerals and Ferro-alloys Group of the National Advisory Council to the Office of Production Management, discussed replacement materials for strategic metals at a meeting of the American Society for Testing Ma-

terials, held at the Franklin Institute on Wednesday, May twenty-eighth.

A Reminder

Members of THE AMERICAN INSTITUTE OF CHEMISTS are again reminded to send the information requested on page 178 to THE INSTITUTE to ensure a correct listing in the new roster.

EMPLOYMENT

Chemists Available

INSTRUCTOR in qualitative and inorganic chemistry. Two years' experience. Ch.E. degree. Wishes position in undergraduate school. Please reply to Box 123, THE CHEMIST.

CHEMIST, J.A.I.C., A.B., M.S. (June 1941) Phi Beta Kappa, two years of college work in organic chemistry, qualitative, quantitative analysis, courses in qualitative organic analysis. Successful university research. Laboratory position desired. Please reply to box 51, THE CHEMIST.

PROFESSOR, F.A.I.C., F.A.A.S., Ph.D., Cornell, successful department head small state college, desires change to teaching position with opportunity for advancement on basis merit displayed. Age 37, married, two children, 16 years' teaching experience, excellent references, available short notice anywhere in United States. Please reply to Box 31, THE CHEMIST.

CHEMICAL ENGINEER, F.A.I.C. Age 35. Varied experience with Bureau of Standards, Du Pont and others qualifies me for semi-works development, process trouble shooting, cost reduction work in many fields. Mechanically minded; analytical viewpoint. Please reply to Box 21, THE CHEMIST.

COMMERCIAL CHEMIST, F.A.I.C., Cornell. Twenty years' experience supervision and administration details. Coal tar, nitrogen soils and fertilizer, plastics, development works, formulating materials specifications. Please reply to Box 23, THE CHEMIST.

COLLEGE TEACHER, American, Ph.D., F.A.I.C., Sigma Xi. Inorganic analytical, organic and industrial chemistry. Several years' university teaching, six years' experience in the chemical industry in heavy chemicals, analytical methods, control, supervision. Publications. Location anywhere. Please reply to Box 25, THE CHEMIST.

CHEMICAL ENGINEER, F.A.I.C., B.Sc., Ch.E., 20 years' experience in management, production, development and consultation. Please reply to Box 41, THE CHEMIST.

CHEMIST-SALESMAN, B.A. chemistry 1935, M.S. 1937, experienced in sales work. Looking for sales or distributorship of chemical products in Philadelphia and Eastern Pennsylvania, age 30, reliable, responsible and aggressive. Please reply to Box 43, THE CHEMIST.

CHEMIST, B.A. chemistry 1935, M.S. 1937. Familiar with analytical, organic, inorganic and physical chemistry. Single, 30 years, free to locate anywhere. Please reply to Box 45, THE CHEMIST.

Members of THE AMERICAN INSTITUTE OF CHEMISTS may list their qualifications under "Chemists Available" or

they may list positions under "Positions Available" columns without charge.

Positions Available

YOUNG CHEMIST with knowledge of dietetics or domestic science to start in as assistant editor on a new food magazine. \$25.00.

CHEMIST with experience in production of food products—jams, jellies, preserves, etc.

CHEMIST who knows rubber dispersions. \$2,600.

PRODUCTION ENGINEER with oil refinery or chemical plant experience.

CHEMICAL ENGINEER experienced with textile chemicals to work in sales service.

CHEMICAL ENGINEER with chemical process experience for sales work. About age 30. \$2,400.

MAN with technical background to take charge of production of lithographic blankets.

For these positions please reply to Box 50, THE CHEMIST.

Applications for Membership

Final action will be taken by the National Council, at its first Fall meeting, on the following applications, in addition to the names listed in the April issue of THE CHEMIST:

For Fellow

Damon, Glenn H.

Associate Professor of Chemistry, Michigan College of Mining and Technology, Houghton, Mich.

Kern, Edward E.

Chief Chemist, A. A. Lund and Associates, 20 East 12th Street, New York, New York.

Mileti, Otto Joseph

General Superintendent, Charles R. Long, Jr., Company, 1630 W. Hill Street, Louisville, Ky.

Mills, James E.

Chief Chemist, Sonoco Products Company, Hartsville, S. C.

Russell, David Allison

Chief Chemist, The Youngstown

Sheet and Tube Company, Youngstown, Ohio.

Schaible, Philip J.

221 Cedar Street, East Lansing, Mich.

Van Evera, B. D.

Professor of Chemistry, Executive Officer, Chemistry Department, The George Washington University, Washington, D. C.

Walde, Arthur W.

Research Chemist, Dr. Salisbury's Laboratories, Charles City, Iowa.

To be Reinstated as Fellow

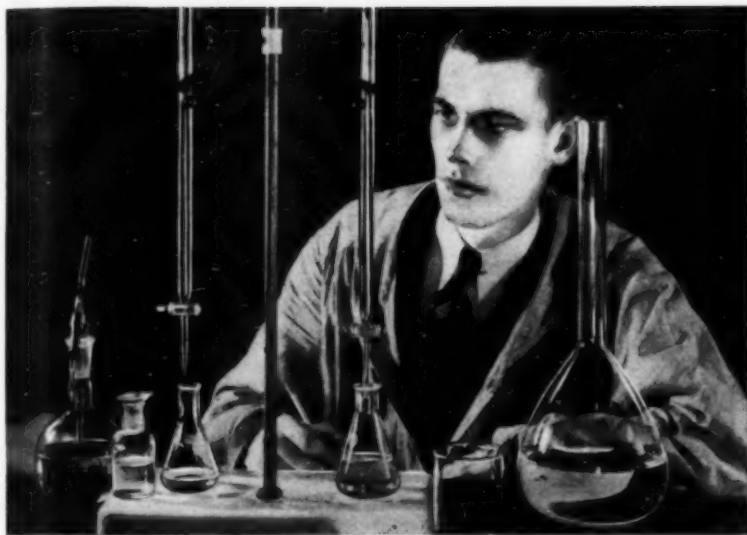
Salkin, Bernard

Owner and Director, The Aphrodite Laboratories, 1670 Carroll Street, Brooklyn, N. Y.

Associate

Bader, Curtis Louis

Director, Nassau County Police Technical Research Laboratory, Police Headquarters, Mineola, N. Y.



*"You cannot teach a man anything;
you can only help him find it within himself."*

—GALILEO

Yes, Professor, some day some of your students will be outstanding chemists... and your advice and direction will have helped them on their way.

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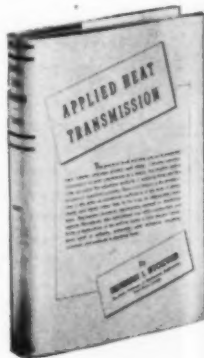
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APPLIED HEAT TRANSMISSION

By Herman J. Stoever, Associate Professor of Mechanical Engineering, Iowa State College. 226 pages, 6 x 9, 115 illustrations\$2.50

This book presents the fundamentals of heat transmission for all who encounter problems in the design and use of power plant and chemical processing apparatus. Gives the information needed to solve the ordinary heat transfer problems and illustrates the method of applying it with the solution of a number of numerical problems. Helpful, practical information also is given on the construction and fields of application of various types of heat transfer equipment and insulating materials used in industry.



THE CHEMIST

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